



### VISIT OF THE IRON AND STEEL INSTITUTE

In accordance with an invitation extended last year by the four leading engineering societies of the United States, members of the Iron and Steel Institute arrived in New York in the third week of October for a tour of the iron and steel centers of the United States. The main party came on the steamer Celtic, arriving at New York Oct. 23, accompanied by Andrew Carnegie, the president of the institute. Including members who had come on earlier steamers, the party numbered about 200, of whom fifty were ladies. The opening session of the New York meeting of the institute was on Monday evening, Oct. 24, when the visitors were welcomed to the United States, replies to the address being made by Sir James Kitson, past-president of the institute, and Mr. Carnegie. It is noteworthy that both took part in a similar function on the first visit of the Iron and Steel Institute to the United States in 1890. A feature of the evening was the presentation to Mr. Carnegie of the Bessemer gold medal, which is awarded each year by the council of the institute for eminent service in the advancement of iron and steel manufacture. On Wednesday, Oct. 26, two sessions of the institute were held at the Hotel Astor, New York, for the reading and discussion of technical papers. The most prominent of these was by James Gayley, first vice-president of the United States Steel Corporation, on "The Application of Dry Air Blast to the Manufacture of Iron." It attracted much attention, and was regarded as one of the most valuable papers ever presented to the institute. Its announcement of the results secured by the refrigeration of air entering the blast furnace and the removal of moisture was considered nothing short of revolutionary. The saving in cost of pig iron, by the increased output and by the decreased consumption of coke, is estimated at about \$1 a ton on present values for raw materials.

From New York the visitors went by special train on Oct. 27 to Philadelphia, spending the next day there; and on Saturday, Oct. 29, going to Washington, where they were received by President Roosevelt. The real work of the trip began at Pittsburg, which was reached in the evening of Oct. 31. The principal works visited were those at Homestead and Duquesne, and the great Westinghouse plants at East Liberty. At Pittsburg the party divided, about 125 going to Cleveland and the others to St. Louis to visit the exposition.

The visitors at Cleveland were taken through the American Steel & Wire Co.'s mills on Nov. 4, and in the evening were given a complimentary banquet. Leaving Cleveland on Nov. 5, they made a stop of two hours at Conneaut, where the famous iron ore unloading plant of the Conneaut docks was

seen in operation, a large ore vessel being at the docks at the time. The return to New York was by way of Buffalo, and many of the visitors sailed on Wednesday, Nov. 9. Others leave on the following Saturday. The trip was made under most favorable auspices, the weather being delightful and the visitors being given every opportunity to inspect furnaces, steel works and finishing mills.

The Iron and Steel Institute, while the greater part of its membership of about 1,900 is in Great Britain, is represented by iron masters and engineers in all the iron producing countries of the world. There are 140 members in the United States.

### MERCHANT MARINE COMMISSION

Mr. Winthrop L. Marvin, secretary of the Merchant Marine Commission, which is inquiring under congressional authority into the state of American shipping in the foreign trade, announces that Chairman Gallinger will call the full commission together in Washington on Tuesday, Nov. 22, to prepare its report and recommendations to congress, which must be ready, according to the law creating the commission, on the first day of the session, Dec. 5.

Hearings of the commission in the south will begin at Galveston (chamber of commerce) on Saturday of this week. The program after the Galveston hearing is as follows:

Leave Galveston Saturday evening, Nov. 12.

Arrive in New Orleans Sunday morning, Nov. 13, St. Charles hotel.

Hearing at New Orleans, board of trade, Monday, Nov. 14.  
Leave New Orleans, Monday, Nov. 14.

Arrive at Pensacola, Tuesday, Nov. 15, at 5:00 a. m.

Hearing Pensacola, chamber of commerce, Tuesday, Nov. 15.

Leave Pensacola Wednesday, Nov. 16, at 7:00 a. m.

Arrive at Brunswick, Wednesday, Nov. 16, at 11:00 p. m.

Hearing in Brunswick, Thursday, Nov. 17, board of trade.

Leave Brunswick, Thursday, Nov. 17, at 8:40 p. m.

Arrive at Newport News, Hotel Warwick, Friday, Nov. 18, at 6:45 p. m.

Hearing at Newport News, chamber of commerce, Saturday, Nov. 19.

It is reported that the Holland Torpedo Boat Co. of New York is to remove its plant from New Suffolk, L. I., to Quincy, Mass., near the works of the Fore River Ship Building Co. The Fore River company has of late built a number of vessels of the Holland submarine type.

**ANCHOR LINER CALEDONIA—BRITISH SHIP BUILDING**

Liverpool, Nov. 1.—The new twin-screw steamer *Caledonia*, launched recently by Messrs. D. & W. Henderson, Glasgow, for the Glasgow and New York service of the Anchor Line, is the largest vessel yet built for the Clyde transatlantic route. Her tonnage is 16,000 tons; she is 515 ft. long, 58 ft. broad, and her reciprocating engines will develop 30,000 H. P. The *Caledonia*, will carry 800 steerage passengers, 400 second and 300 first-class passengers, besides affording luxurious state-room accommodation. Speaking at a special meeting of the Anchor Line debenture holders held in London on Friday, called to adopt a supplemental trust deed, Mr. W. F. G. Anderson gave some interesting particulars relative to the progressive character of the Anchor Line. During the last five years he said the company had disposed of 24,000 tons of their older and smaller vessels. They had built nine new ships with a gross tonnage of 50,000 tons. Also they had bought a second-hand steamer of 5,000 tons, admirably adapted for their work, and they had the *Caledonia* building, so that when she was delivered to them they would have added 65,000 tons to their fleet in that period. When the *Caledonia* took her place in the Glasgow-New York service next spring she would compete favorably with the very finest vessels afloat. The directors were adopting their policy to circumstances as they altered, and to maintaining the position which they had long held as a first-class passenger line.

Messrs. Napier & Miller, Ltd., have launched just recently another twin-screw ice-breaker named the *Montcalm*, which they have built for the Canadian government for work on the St. Lawrence to the order of Messrs. Fleming & Ferguson, Ltd., Paisley, who are supplying the machinery. The principal dimensions of the vessel are: Length, 245 ft.; breadth, 40 ft. 6 in.; depth, 18 ft., with a gross tonnage of about 1,350 tons. The vessel has been built under Lloyd's special survey, and is designed for ice-breaking purposes, being greatly strengthened in order to resist the heavy pressure to which she will be subjected. The shell plating at the bows and where subject to ice-pressure is all of double thickness, with intermediate frames extending all fore-and-aft. The keel, stem, sternpost, propeller brackets and rudder are also extra strong and heavy and made of nickel steel. On the sternpost is fitted a massive cast-steel knife for the double purpose of breaking ice when working astern and protecting the rudder stock. Although principally intended for ice-breaking, the steamer is designed with fine lines to attain a high rate of speed, and is fitted up as a government yacht. The vessel has been built to the designs and under the superintendence of Capt. M. P. McElhinney, nautical adviser to the Canadian government. The machinery consists of two sets of triple-expansion engines, having cylinders, 23½, 38 and 64 in. in diameter, with a 42-in. stroke. The boilers are of the water-tube type by Messrs. Babcock & Wilcox, Ltd.

Sixty steamers of 111,000 tons gross, and twenty sailing ships of 2,213 tons net, or a total of eighty vessels of 113,303 tons, were added to the register of the United Kingdom in September, as compared with eighty-eight vessels of 103,653 tons in September of last year, and seventy-five vessels of 98,315 tons in September of 1902. The registers were closed during the month of thirty steamers of 47,225 tons gross (of which three of 7,391 tons were sold to Japanese owners) and thirty-one sailing ships of 5,548 tons net, or a total of sixty-one vessels of 52,773 tons, against sixty-three vessels of 56,608 tons in September last year, and fifty-seven vessels of 47,536 tons in September, 1902. The net increase of tonnage for the month has been nineteen vessels of 60,530 tons, which compares with twenty-five vessels of 47,045 tons a year ago, and eighteen vessels of 50,779 tons in September, 1902. For the nine months the net addition to the register of the United Kingdom has been 153 vessels of 403,382 tons, against 248

vessels of 359,841 tons in the corresponding period of last year, and 262 vessels of 610,482 tons in 1902.

Scotch ship building returns are more cheerful reading than for some time past. In the ten months ending with October Scotch ship builders have launched 264 vessels of 355,670 tons. This compares with 242 vessels of 377,073 tons in the first ten months of last year, 446,269 tons in 1902, and 443,565 tons in 1901, and 398,182 tons in 1900. But while the total is the lowest since 1897, the fact that new tonnage is more freely talked about leads one to believe that more prosperous times are returning. The launches in October numbered twenty-six and aggregated 43,395 tons. Twenty vessels of 39,155 tons were built on the Clyde, three of 700 tons on the Forth, one of 3,200 tons on the Tay, and two of 340 tons on the Dee. The largest vessel was the Anchor liner, *Caledonia*, of 9,400 tons, built at Partick.

Of new work about 42,000 tons were reported, making a total for the ten months of 396,000. Prospects are now therefore slightly better than they were a few months ago. Two fresh contracts are just reported, one for four steamers of 3,700 tons dead weight, which the Danish-Russian Co., Copenhagen, has placed with the Clyde Ship Building & Engineering Co., and another for a steamer of about 4,000 tons, which Messrs. Russel & Co., Port Glasgow, are to build for the Lyle Shipping Co., Greenock. The work on hand on the Clyde is now, with the help of Messrs. Beardmore's big battleship and the ten steamers for the Thames, considerably more than it was at this time last year.

**MR. PENDLETON DEFINES DEMOCRACY'S ATTITUDE**

In a letter which has just been made public Mr. Fields S. Pendleton, 130 Pearl street, New York, thus defines the conclusion of the Democratic party upon the question of protection to shipping in the foreign trade:

"The Democratic party no longer advocates the free American registry of foreign-built ships—it has abandoned free trade and advocates protection through the old successful Democratic policy of discriminating duties for restoring American ships to the foreign-carrying trade. Proof of this assertion will be found:

- "1. Shipping plank in Democratic national platform.
- "2. Statement on American shipping in Democratic text book.
- "3. Extract from report signed by all the Democratic members of the house merchant marine and fisheries committee.
- "4. Reference to our merchant marine in Judge Parker's letter of acceptance.

"With the Democratic party thus advocating and promising to restore American shipping, with an insistent demand for an American merchant marine growing stronger in all parts of the Union, with both parties and their candidates favoring legislation, the next session of congress should witness the adoption of an American maritime policy that will again give to American-built ships the carrying of the great bulk of our imports and exports. As a Democrat and a ship owner I beg to request that this matter may receive your earnest attention."

The Clyde trustees are experimenting at Queen's dock with another American "grab" for discharging cargoes of iron ore and other minerals. Neither of the two American inventions previously tried have been more successful than the home-made grab—the Priestman. All have the defect of sometimes lifting only one big lump in the mass of matter caught, and allowing the rest to slip through. Each of them when working in suitable material can do the work of a number of men, but they have their own notions of what is suitable for their grip.—Glasgow Shipping Notes.

**MR. AARON VANDERBILT**

It was appropriate and fitting that the very first communication submitted to the Merchant Marine Commission, when it began its tour of the country to inquire into the state of American shipping in the foreign trade, should have been submitted by Mr. Aaron Vanderbilt, chairman of the merchant marine committee of the New York Board of Trade and Transportation. No man in the United States has done more for the cause of shipping than Mr. Vanderbilt. His efforts have been indefatigable in this direction and he is as busy today as he was twenty years ago. Deeply patriotic motives have stirred Mr. Vanderbilt to this end, for if his career be inquired into it will be found that he has all his life urged the up-building of the country's prowess on sea—through a competent naval reserve supported by a capacious merchant marine.

Mr. Vanderbilt's career has been extremely noteworthy. He is descended from a family that has borne a distinguished part in the maritime history of the country. He was born in Tompkinsville, Staten Island, Jan. 29, 1844, and received his early education at the public and private schools of New York and Brooklyn. In his fifteenth year he entered the maritime business in New York as a clerk. While engaged in the merchant marine service he made several voyages abroad and acquired a practical knowledge of navigation. Mr. Vanderbilt was in the south of France when Lincoln called for volunteers and he immediately sailed for home, reaching New York just after the battle of Bull Run. He offered his services and was appointed acting master's mate and assigned to the sloop Savannah by Rear Admiral Hiram Paulding. He was instructed in the broadsword, small arm and great gun practice and remained for some time an assistant instructor of volunteer officers on board the Savannah. Desiring more active duty, Mr. Vanderbilt was assigned on application to the gunboat Vicksburg, which was for a time guardship at the port of New York. He was subsequently ordered to the North Atlantic squadron, commanded by Rear Admiral S. P. Lee, then blockading Cape Fear river, North Carolina. Meanwhile he made several short cruises, notably those to the defense of Moorehead City, N. C., and Annapolis and reconnoitred and sketched thirty miles of the enemy's coast north and south of Cape Fear previous to contemplated attacks on the forts. Mr. Vanderbilt was next ordered to the flagship Malvern and assigned to the staff of Rear Admiral David D. Porter, then commanding the squadron. He took part in the attacks on Fort Fisher in December, 1864, and January, 1865, and was promoted to the position of ensign for his skill and bravery. He also participated in the engagements of Forts Anderson, Strong, Lee and the capital of Smithville and Wilmington. He then proceeded to Appomattox and James rivers and was present at the siege and capture of Petersburg and Richmond. He participated in the engagements with the Half Moon batteries at Fort Cas-

well, N. C., and Howlett batteries, Va. During this time Ensign Vanderbilt was bearer of important dispatches from Admiral Porter to distant division commanders of the squadron and to and from the secretary of the navy at Washington. He later examined and made plans of all the Confederate fortifications on Cape Fear river. On the fall of Richmond he entered the city as guard to President Lincoln and accompanied the president to the house of Jefferson Davis during the interview with the city authorities.

At the end of the civil war Mr. Vanderbilt again entered maritime business in New York. He established a line of packets running from New York to Florida and was also associated with the operation of vessels to the Mediterranean, later assuming the position of general superintendent of the New York & Cuba Mail Line.

A cause which lay very close to Mr. Vanderbilt's heart was the establishment of a naval reserve to supplement the navy in the same manner that the militia of the various states supplements the regular army. As chairman of the naval reserve committee of the Board of Trade and Transportation, Mr. Vanderbilt took up the subject with Hon. William C. Whitney, who was secretary of the navy at that time, and projected a most energetic campaign throughout the country in favor of it. His point was that it would protect the sea in times of war with a disciplined nucleus which would act as an advance guard on duty while the volunteers were being prepared for war.

It is Mr. Vanderbilt's later efforts, however, for the up-building of the merchant marine of the United States that is bringing him prominently to the front in the shipping world at present. Waking and

sleeping it is a theme that is constantly with him and he has been the inspiration of hundreds when the fight seemed indeed a most gloomy one. While transportation on inland and coast waters is well developed on the broad ocean, where the real marine strength of the country ought to be, it is a withered member.

The Merchant Marine Commission invited Mr. Vanderbilt to state what in his judgment should be done to arrest the decline of our shipping in the over-sea trade and to restore the old maritime strength of the country. Mr. Vanderbilt's reply to this question expresses his position quite well and it is therefore recounted as follows:

"The special committee on the merchant marine of the New York Board of Trade and Transportation, of which committee I have the honor to be the chairman, was appointed to inquire into the alarmingly depleted state of American shipping in the foreign trade which is now 100,000 registered tons less than almost 100 years ago when we carried 90 per cent of our over-sea commerce, while we now carry less than 9 per cent. The committee prepared a statement showing these facts, and this with the board's resolutions setting forth the non-partisan purpose of our inquiry were forwarded to all the newspapers and commercial associations of the United



MR. AARON VANDERBILT.



States. We have been gratified by the volume and character of response. The result has been a vivid demonstration that popular interest in the cause of American shipping is deep and earnest, not only in our seaboard communities but in the Mississippi valley and the farther west. We have received replies from nearly every state and territory of the union, hundreds in aggregate number, all manifesting a desire for the upbuilding of a new American merchant marine.

"Many commercial associations in answer to the board's inquiries have adopted resolutions urging the question of the American ship upon the attention of the country's business interests and of congress. Some of these resolutions have indicated a preference for this or that particular policy of relief, but in the majority of cases there has been merely an emphatic declaration that something should be done, leaving the precise method to further investigation or to the wisdom of the government. Of course the question has aroused favorable action in seaboard cities where maritime interests are strong, but it is significant that earnest resolutions have come from important cities of the middle west like Denver, Omaha, Milwaukee and from San Francisco and Seattle, as well as New York and Philadelphia, and even from Alaska, Porto Rico and the Hawaiian islands. Resolutions and correspondence are still coming in and it is plain that the question of our merchant marine steadily assumes increased importance before the country. It is not a pleasant thought to the patriotic citizen that our ocean tonnage is now 100,000 tons less than it was almost 100 years ago when it carried 90 per cent of our commerce and now carries less than 9 per cent.

"Under such conditions we may contemplate with alarm our predicament as a nation in the event of difficulties with a foreign power. The navy and merchant marine of Japan in her war with Russia commands the sea. Her merchant marine furnishes a reserve for her fleet and transportation for her armies and supplies, again demonstrating the advantage of sea power in a nation's peril. The committee has not as yet finished its investigations and deliberations and I am, therefore, unable to present its views at this time. I feel that under the circumstances any expression of my personal opinion of a specific method would be out of place and I prefer to defer the making of any statement until I can do so with the sanction of my committee and the approval of the body it represents."

#### SUDDEN AND LARGE COMPASS DEVIATION

Some unexplained deviations of the magnetic needle on ship board, which, it is claimed, have caused the destruction of some vessels, and have drawn others far out of their courses, are discussed in *Cosmos* (Paris, Oct. 1). An editorial note in that paper is thus translated for the *Literary Digest*:

"Whenever a ship is lost from being out of her proper course, it is ascribed to perturbations of the compass, and numerous facts seem to indicate that although this may not be so frequent as sea captains say it is, such a phenomenon may take place. Nevertheless, a serious inquiry is yet to be made, and M. August Krogh of Copenhagen has made some preliminary steps toward one.

"The catastrophe that took place on the morning of June 28 last, when the Danish vessel *Norge* was lost with 600 persons, is the first case that he examines with care. According to the course of this vessel, she should have passed about 25 miles south of Rockall rocks, on which she struck. The last observation giving the ship's position was made twelve hours before she grounded. At this time there were no signs of electric disturbances, nor of a deviation of the magnetic needle, and it seems impossible to explain the difference between the real and calculated positions except by

a sudden and considerable deviation of the compass. This supposition finds serious support in the reports of two captains who have observed similar anomalies in the same waters, which facts tend to prove that the vicinity of Rockall is most dangerous.

"Several years ago, Capt. Hveysel of the *L. H. Carl* was sailing from the United States to Denmark, keeping as close as possible to the arc of the great circle that runs from Newfoundland to Pentland strait in the north of Scotland. At about 20° west of Rockall he took his position at noon. But, making new observations at midnight, he found to his astonishment that the vessel had gone about a quarter more to the south than that indicated by the compass. An observation of the pole-star showed, in fact, that the compass had deviated toward the east between 10 and 11°. The weather was fine, but there was observed in the north, on the horizon, a slightly luminous band, which was attributed to an aurora borealis; and it was supposed that this had caused the deviation of the needle. The course was rectified, but the deviation of the needle continued till nearly midnight, when it gave the normal indication, the traces of aurora having disappeared.

"This year, almost on the date of the *Norge* disaster, between June 24 and 25, Capt. Horner, commanding the steamer *Elixer*, on her way from Port Ingles, Fla., to Linhamm, Sweden, found himself in the vicinity of Rockall. On the evening of the 24th, he saw that the variation of the compass had suddenly increased to 9°, which had carried him well to the north of his course. He had expected to pass 20 miles from Rockall, and an observation taken on June 25 informed him that he had passed 45 miles away. After he had passed through Pentland strait, the compass resumed its normal state.

"M. Krogh notes that deviations so sudden and so large have never been recorded in the observatories; but it is certain that we should not make a comparison between movements of needles in magnetic observatories and those of compass needles placed in steel ships. . . . Perhaps it may not be impossible to explain such temporary deviations on ship-board as have just been noted by the known variations of the earth's magnetism."

#### BIDS FOR BUILDING THE SCOUT SHIPS

A date will soon be set for the opening of bids for the construction of the scout ships *Chester*, *Salem* and *Birmingham*, as Secretary Morton of the navy department has approved the chief characteristics of the vessels. Length of these ships between perpendiculars will be 424 ft.; breadth, 46 ft. 8 in.; draught at full load, 18 ft. 3½ in.; depth amidships, 36 ft. 5 15-16 in.; displacement, loaded, 4,310 tons; draught on trial, 16 ft. 10 in.; displacement on trial, 3,750 tons; speed, 24 knots; battery, twelve 3-in. guns, two 21-in. submerged torpedo tubes. They will carry 3,600 rounds of ammunition for 3-in. guns and eight torpedoes. The estimated weight of battery and full load of ammunition is 140 tons. The length of the machinery space will be protected by inclined nickel steel deck 1½ in. thick and vertical steel protective deck 2 in. thick. There will be at each end a nickel steel bulkhead 1 in. thick. The steering gear above the water line will have nickel steel protection 2 in. thick on sides and 1 in. on top. The scouts will be fitted with four ammunition hoists for the 3-in. guns. Accommodations will be provided for one commanding officer, ten ward room officers, five warrant officers and 368 men. The ships will carry reciprocating engines with about 16,000 H. P.

Mahoning Steamship Co. is the name selected for the corporation that is to own the two steel steamers for which contracts were let ten days ago to the American Ship Building Co. by Mr. D. R. Hanna of Cleveland.



### NEWPORT NEWS SHIP YARD MATTERS

Norfolk, Va., Nov. 9.—Of course the ship yard officials at Newport News and the people of this section generally are more than pleased with the outcome of the official speed trial off the Massachusetts coast a few days ago of the new armored cruiser West Virginia, built at the Newport News yard. With perfect weather and sea conditions the West Virginia went over the Cape Ann course for her official four-hour speed trial and developed an average speed of 22.14 knots. The contract called for a sustained average speed for four hours of 22 knots. The course measured 88 miles, 44 miles up the coast and return. This distance was covered in 3 hours, 58 minutes and 33 seconds, an average of 22.14 knots. Tidal corrections will not make any material difference in the average. The West Virginia is now about 96 per cent completed and she will go into commission during December. Contrary to its custom and the custom of every ship yard in America, the Newport News Ship Building & Dry Dock Co. sent the Virginia north for her official trial without a preliminary builders' trial at sea. This was, of course, due to confidence in the vessel.

Lake submarine boat No. 10, the third to be completed at the Newport News yard for the Lakes, has been launched and in a short time the other two boats, the last of the five contracted for, will be ready to ship. It is understood that the boat now in the water will be tried out for the United States government and will not be shipped abroad as were the first two completed and as the other two probably will be. That the two boats now on the high sea are destined to reach the Russian naval lines eventually there seems to be no doubt in Newport News. It is believed that the other two boats will be shipped to the same destination. Much interest has been manifested here in the construction of the boats in view, of the uncertainty of the owners being able to place the submarines at a point where the Russians can get hold of them. The Lakes and their lieutenants were very secretive about their plans and would not discuss the movements of the little vessels.

The ship yard is now employing nearly 8,000 men, according to reliable sources, and the weekly pay roll amounts to something like \$80,000.

The new protected cruiser Charleston is rapidly taking shape. She has her four funnels, both military masts are in position as are also several of the large boat cranes. She will soon be ready for her official trial.

The ferry boat Elmira, building at the yard of the Newport News company for the Lackawanna railway, was launched a few days ago without the customary ceremony that marks launchings at the ship yard across the James river. Miss Eleanor Harris, a niece of General Superintendent Walter A. Post, christened the Elmira as it started down the ways. The gates of the yard were not thrown open to the public, in view, it is stated, of the secrecy which is being maintained in connection with the construction of the submarine boats for the Lakes.

### PETROLEUM FUEL SUPPLY VERY SMALL

One point on which United States naval engineers who have thoroughly investigated the liquid fuel question lay special stress is that efforts should not be made to use fuel oil except for special purposes in particular localities. In considering the problem of attempting to use oil as fuel for either marine or naval purposes it should be remembered that if the available supply of crude petroleum could be used as a fuel it would not meet over 3 per cent of the world's demand for coal and other combustibles.

The fuel oil inquiry made by the navy was the most thorough ever made. Among the conclusions drawn from tests that extended over a period of nearly a year are the following:

There will be no difficulty in burning oil in a uniform man-

ner with an intelligent fire-room force. For general purposes, on shore, steam is a better spraying medium than air, but the consumption of fuel oil can not be forced to as great an extent with steam as the atomizing agent as when highly heated compressed air is used for this purpose. This is an important point on board warships. It was found that the evaporative efficiency of crude and refined oil is practically the same, no matter from what locality the oil may come. However, the danger of using crude oil is greater. The oil should be heated in some way to secure a uniform supply, and reserve burners should be installed. The simpler the furnace, the greater its efficiency. Firebrick arches only reduce the volume of space necessary for effecting complete combustion. Oil enables the marine boiler to be forced more readily than coal, but when thus used it does not remove the smoke nuisance. No attempt should be made on war vessels to use oil as an auxiliary or supplementary to coal. Such an installation is certain to prove unsatisfactory. It is thought that the mechanical features of the liquid fuel problem have been practically and satisfactorily solved. For manufacturing purposes the financial and supply features are the only hindrances to the use of crude petroleum as a standard fuel. For mercantile purposes the commercial and transportation features of the problem are existing bars which limit the use of oil fuel in merchant ships. For naval purposes there is the additional and serious difficulty to be overcome of providing a satisfactory and safe structural arrangement for carrying an adequate bunker supply.

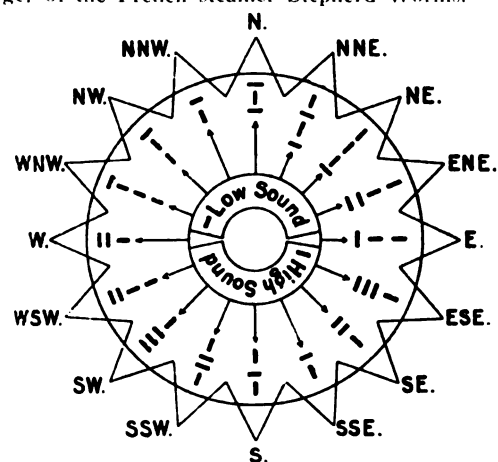
### ANOTHER FOG SIGNAL DEVICE

The contrivance illustrated herewith is intended to determine the direction of vessels in fog and is the invention of Captain Basroger of the French steamer *Stepherd Worms*. The signal is

given by a whistle or whistles emitting two sounds, one in a very high key, the other very low. These sounds, adapted to the sixteen principal points of the compass, signal the exact direction in which the vessel is going. In the diagram the high key is represented by a vertical dash and the low key by a horizontal dash, the diagram being read in the direction of the arrows. If a ship is going north it gives a low, a high, and a low whistle; if it is going west-northwest it gives three high whistles and one low or deep whistle. All the signals from north to south by way of the east begin with a deep or coarse whistle, and all those from the north to the south by way of the west begin with a high or keen whistle. Arrangement tells the principal direction of the vessel by the first sound that strikes the ear.

The instrument proper consists of a box containing a cogged drum which, somewhat after the manner of the keys in a wind instrument, determines whether the sound be high or low. A retarder, controlled by a crank, causes the rotation of the drum, so that two sounds can not be blended or confused. The crank turns once every second. In sailing vessels the signals are produced by bells.

The tug Bruce, owned by the Ford River Lumber Co., burned to the water's edge at Escanaba a few days ago.





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Now that the presidential election is over the fiscal policy of the country may be regarded as settled for another period of four years at least and the nation can definitely attack the industrial problems which confront it. It was extremely interesting to note during the presidential campaign that the question of shipping received more attention than any other question. In fact in a number of districts, and it might even be said states, it was the only subject discussed. The Democrats were quite as eager to make it an issue as the Republicans and both parties were a unit upon the one thought that something should be done for American shipping in the foreign trade. With this unanimity existing, therefore, it is confidently expected that a shipping measure will be passed by congress this winter. The Merchant Marine Commission, which under the provisions of the Gardner bill, was appointed last spring to make a tour of the country to inquire into the state of American shipping in the foreign trade and to discover a remedy therefor will conclude its hearings in the southern states during the present month. The hearings at Galveston, Texas, will be held under the auspices of the chamber of commerce, at New Orleans under the auspices of the board of trade, at Brunswick, Ga., under the auspices of the board

of trade and at Newport News, Va., under the auspices of the chamber of commerce. Senator Thomas S. Martin of Virginia is chairman of the southern sub-commission and his associates are Senator Stephen R. Mallory of Florida, Representative Thomas Spight of Mississippi and Representative Edward S. Minor of Wisconsin. At the conclusion of the hearings in the southern states the full commission will assemble in Washington during the week of Nov. 21 to prepare its report and recommendations to congress. It is quite likely that the recommendations of the commission will be incorporated in a bill. What these recommendations are it is, of course, too early to state, but it is believed that the commission will advocate the passage of a bill based upon discrimination in tonnage dues and import duties. Such a measure is expected to receive Democratic as well as Republican support.

In reviewing the testimony submitted to the commission in its continent-covering trip the significant thing is that the weightiest testimony was submitted not by shippers and ship builders but by merchants, manufacturers and bankers. Even the farming interest was represented in a plea for an uninterrupted highway over which the grain of this country might flow to foreign ports. As for the manufacturers, scores of them testified to sad experiences in delayed dispatch abroad owing to inability to establish through connections from the United States. Bankers represented that the carriage of American products abroad in American ships would result in the establishment of American branch banks in foreign countries owing to the assurance which would constantly be given of direct communication with the home establishment. In fact the testimony which was submitted to the commission was catholic in its character, proving that interest in the upbuilding of the merchant marine is common to the whole country and is not confined to any particular section or any particular trade. Indeed the ship builder and the ship owner are among the least interested in this question. A ship is not the product of one man or one company. The ship builder merely assembles parts which scores of other companies and thousands of other hands have contributed to make. What is the raw material of one enterprise is the finished product of another and this is especially true of ship building. The ship plate is the ship builders' raw material, but it is the steel makers' finished product. Before it became a ship plate it was a variety of things and in every one of its transformations it employed hundreds of hands and paid a constant tribute to labor. The ship plate was originally ore in the ground. It gave work to the miner, to the railway employes, to the dock men that put it in the shipping pockets, to the vessel that carried it, to the unloading apparatus that took it from the

ship, to the railway that transported it to the furnaces where it was smelted into pig iron, converted into steel and rolled into a plate. Every process added to its cost because it employed the time of some man.

The same is true of the multiplicity of auxiliary articles that enter into the construction of a ship. A ship is the combined product of a hundred arts and no ship yard can be established without stimulating a hundred enterprises. Ruskin says very truly that as a gregarious animal man has never done anything greater than the building of a ship.

Great Britain is today the world's producer of ships. Why? Because she was aided by a generous government in becoming so. When steam supplanted sail as the motive power for the propulsion of ships Great Britain was very quick to perceive the enormous potential advantage which the steamer possessed over the sailing vessel. She immediately pledged her treasury to the extent of \$6,000,000 per annum to aid the establishment of ocean mail lines by steamers to various ports of the world. In ten years she had paid out \$60,000,000. What was the effect of this? New ship yards were established throughout Great Britain; steamers multiplied rapidly; her trade followed the mails to the remotest quarters of the earth, until today she is practically the only country running steamers to a considerable portion of the globe.

Governmental aid has done this for Britain. Why cannot it do likewise for the United States?

Especially interesting was the paper delivered before the recent International Engineering Congress held at St. Louis by Mr. G. P. North, showing the importance of cheap freight rates as an economical factor in American industry. In supporting his argument Mr. North showed that the average freight rate of transportation per ton per mile in the United Kingdom is 2.8 cents, in Russia 2.4 cents, in France 2.2 cents, in Germany 1.64 cents and in the United States .8 cents. The American rate in 1885 was 1.057. It is now .764. Mr. North pointed out that if the rates in the United States had remained as in 1885 there would have been paid in 1903, \$3,500,000,000 more for transporting freight than was paid, and if the freight rates had been equal to those of England, and granting as large a business possible at such rates, the cost would have been nearly \$33,000,000,000 greater. Of course no such volume of business could have been transacted at such rates. It is the extraordinary cheapness of transportation which has created the enormous volume of business that is now being transacted by the people of the United States.

As a result of increase in the size of vessels engaged in the St. Lawrence trade this year, it is expected that the port of Montreal will, for the first time in its history, reach the 2,000,000-ton mark in aggregate of shipping. The total tonnage to Nov. 1 was 1,700,000.

#### MR. GAYLEY'S TALK TO ENGLISH IRONMASTERS

At the dinner given on Friday evening last by the iron and steel interests of Cleveland to visiting members of the Iron and Steel Institute, Mr. James Gayley, first vice-president of the United States Steel Corporation, responded to the toast "The Lake Region as a Factor in American Development." He gave facts which showed the marvelous growth of the traffic of the lakes in recent years, and made some statements as to the cheapness of the lake haul on ore which were astonishing to his British hearers. A summary of Mr. Gayley's remarks follows:

Of the iron ore mined in the United States, the Lake Superior regions now furnish about 75 per cent. Fifty years ago the first year's shipment of Lake Superior ore amounted to 1,500 tons. Twenty years ago a season's shipment was only 1,000,000 tons; while the average of the past two years has been 25,000,000 tons. In view of the rate of progress made in recent years, the speaker considered it within bounds to look for a total shipment of 45,000,000 tons in a single season in the next ten years.

Notwithstanding many of the Lake Superior mines are a thousand miles from the blast furnaces of the Central West, ore can be delivered at lower lake ports at the unparalleled rate of 8-10 mill per ton per mile, this extreme cheapness of transportation being the product of a rapid development in facilities for lake transport and a refinement in economy due to the engineering progress of recent years in all the operations connected with lake traffic. Forty years ago boats were loaded laboriously, and on arriving at lower lake ports were unloaded by hoisting the ore to the dock with horse power, transferring it to wheelbarrows, from which lines of men dumped it upon the ore piles or into cars. This year the steamer Wolvin, carrying 10,500 tons of ore, was loaded in two hours at upper lake ports, and the cargo unloaded on Lake Erie docks in four and one-half hours. The traffic of the Sault canal is equal, in two and a half months of the navigation season (which is seven months in all) to the total traffic of the Suez canal for an entire year. The port of Duluth, which a few decades ago was celebrated in a speech in congress that was received rather as a piece of humor than as a prediction that would be in any measure realized, has now a greater tonnage than Liverpool and New York, its traffic representing coal for the great northwest, grain coming therefrom, besides lumber from the same regions and the enormous tonnage of iron ore since the discovery of the Mesabi range in Minnesota.

The wonderful results in the increase of tonnage on the lakes and the cheapening of the freight rate have been accomplished by the skill, the aggressiveness and the daring of our engineers, who have simplified transportation and replaced much of the dehumanizing hand labor by unloading with machines of marvelous capacity. It is to be remembered, however, that the engineer in these exploits has had the co-operation of progressive and aggressive capitalists, the combination of engineering skill and business foresight accomplishing what neither engineer nor business man could have undertaken without the aid of the other. It is the business man of courage and insight who makes possible the realization of the schemes of the engineer.

The speaker referred to the coincidence of the establishment of the first iron works in Cleveland in the same year in which Neilson gave to the world his hot blast. The results which have flowed from the two have been great and far-reaching. Referring to the greatness of the present industrial era, and to its promise as even greater than its achievement, the speaker attributed much of it all to the Great Lakes, which have cheapened the cost of steel, enriched the whole country, and thus have contributed vastly to the peace and civilization of the world.



### MR. G. A. TOMLINSON OF DULUTH

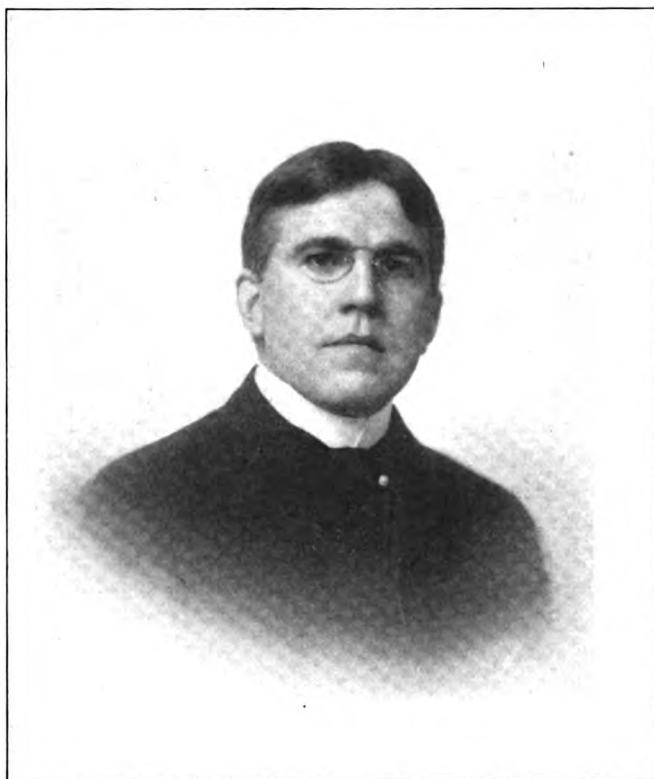
Considerable interest attaches at the present time to the personality of Mr. G. A. Tomlinson of Duluth. As years go Mr. Tomlinson is not very old; nor is he to be considered as having had a long experience in vessel operation. It was not his original occupation. In fact his advent in the vessel trade is of very recent date but he has already proved himself a past master of it. Considered as a unit the Tomlinson fleet will next season be the best fleet on the great lakes. It is modern in every particular and when the five new vessels are finished the average carrying capacity of the fleet will be 7,276 gross tons. Excellent as is the fleet of vessels belonging to the Steel Corporation it does not as a unit approach the Tomlinson fleet. Of course, there are twenty-two vessels of under 3,000 tons carrying capacity in the fleet of the Steel Corporation, so that its general average is cut down thereby. These vessels have been offered for sale and as soon as they are disposed of the Steel Corporation's average will be very much higher indeed.

When the Merchant Marine Commission were holding their inquiries in Cleveland into the state of shipping in the foreign trade, Mr. Tomlinson was one of the most interesting speakers that appeared before the commission. His testimony was devoted exclusively to the grain trade and was full of meat. Upon this occasion Mr. Tomlinson said:

"I come from the northwest, which is the wheat bin of this country, and I want to say just a few words with regard to the raising and the transportation of grain. We are a long way (up in Duluth and Minnesota) from the seat of human activities. We do not know very much about the finances of the east. We do not know very much about the great industries of which this city is so splendid a center. We do not know very much about the public affairs at Washington. We do know, however, how to raise wheat up in the northwest, and we know that after we raise the finest wheat in the world the thing we have to do is to find a market. The market of northwest wheat is Liverpool, and in order to compete in the Liverpool market we must have the very best transportation facilities that the world can supply. We are bringing wheat from Duluth to Buffalo today for a cent and a half a bushel, and from Buffalo to New York by rail for about 3 cents a bushel. After we reach the seaboard we meet the foreign ship.

"Now, the Duluth shipper has no particular prejudice against the foreign ship, only what his experience has taught him. It has taught him very recently, during the Boer war, when Great Britain made so many requisitions for her so-called tramp ships, that there was a scarcity of transportation facilities out of New York. Immediately north of us is another great wheat field, and a growing one, and it was the observation and experience of the grain shipper in Duluth that, while it was possible only with great difficulty to obtain transportation during the Boer war from New York, the

British ship went into the harbor of Montreal and took the Canadian grain without any difficulty whatever. So marked did that difficulty become that much of the American grain was shipped via Georgian bay to Montreal to find transportation facilities to Liverpool. That is the difficulty we are meeting, and it is a difficulty that is growing with us. It seems to us in Duluth that the British government is offering every facility to prejudice the transportation of American grain for the benefit of its Canadian colony. It is human nature, and it is all right from their standpoint; but we need a constant and a loyal foreign transportation marine, and in my judgment we will have it only when we have American ships.



MR. G. A. TOMLINSON.

fall nowadays the freight broker in New York speculates in order to protect his shipments. Of course, the grain moves very largely in the fall.

Representative Grosvenor: We were told by a shipper of corn in Chicago that freight rates were so low that corn was being shipped, or had recently been shipped, at a loss to the steamship company; that they bid the freights so low that they could not pay the London dock charges out of the freight.

The Chairman: They practically took it as ballast?

Representative Grosvenor: Yes; they practically took it as ballast.

Mr. Tomlinson: That is occasionally true. It is like all other business experiences. Sometimes we make money and sometimes we do not.

Representative Minor: It does not take me long to see it. In your opinion, Captain, is any congressional action necessary to protect the lake traffic from any impending menace or danger from this invasion of foreign vessels?

Representative Grosvenor: Can you contract your wheat through from Duluth to Liverpool?

Mr. Tomlinson: Yes, sir; that is a growing practice.

Representative Grosvenor: Paying the freight in one contract?

Mr. Tomlinson: Yes, sir; on one bill of lading.

Representative Grosvenor: What is the usual freight from New York?

Mr. Tomlinson: That is a very fluctuating thing, General. It runs from 3 to 5 cents.

Representative Grosvenor: A bushel?

Mr. Tomlinson: Yes, sir. I have known it lower than 3 cents.

#### COST OF BOER CONFLICT.

The Chairman: It has been suggested to the commission that at the time Great Britain withdrew her ships for transport purposes there was a large increase in the freight rates, I think 30 per cent.

Mr. Tomlinson: That is true, sir.

The Chairman: And that may happen at any time in the event of a foreign war.

Mr. Tomlinson: Yes; of course, if we obtain the same rate that the Canadian grain obtains that is very satisfactory to us; but it is a notorious fact that every

Representative Minor: You spoke of the Boer war and the withdrawal of certain tramp ships. They were used, I suppose, to transport troops and munitions of war and supplies for the army in Africa?

Mr. Tomlinson: I suppose so.

Representative Minor: That was rather a small affair, when we think of modern wars, and yet it affected your freight rates?

Mr. Tomlinson: Yes, sir.

Representative Minor: Now, suppose that a war should take place between Germany and England or that the two nations should become involved in a serious war, and that they should withdraw, in the same proportion as they were withdrawn for that small war over in Africa, those tramp ships to be used as transports to supply their army and navy, what then would be the effect on your wheat fields?

Mr. Tomlinson: It would paralyze us.

Representative Minor: We are exporting and have been exporting, at the rate of about \$500,000,000 a year, agricultural products, manufacturers' products, etc. Suppose that war should continue for six months with these tramp ships withdrawn, what would be the effect on the whole country? Who would buy our products? Who would pay money for them, and what would we do with them during that time?

Mr. Tomlinson: Well, the farmers' grain would be eaten up by the storage charges in elevators. It is a very unfortunate fact in the northwest that the farmer has not obtained sufficient financial resources to very generally build granaries. I mean by that he must put his grain into a terminal house in either Minneapolis or Duluth, and that would cost him from 12 to 14 cents a year.

Representative Minor: It would cause a general paralysis of American business?

Mr. Tomlinson: In my judgment it would.

Representative Humphrey: Under the circumstances which Capt. Minor has described, a great portion of the farmers' products of the northwest would rot in the fields, would it not?

Mr. Tomlinson: It would not rot in the fields, sir, for the reason that for a very large proportion of the crop there are now terminal facilities. We can move it to Buffalo, where there is a storage capacity of, I think, a little over 30,000,000 bushels, about 40,000,000 in Duluth, and about 50,000,000 in Minneapolis.

Representative Minor: Suppose the condition should last a year, what would be the result?

Mr. Tomlinson: If another crop came on us, we could not do anything.

Officials of the United States Steel Corporation deny positively reports circulated recently to the effect that the Steel Corporation is planning for the purchase of the Lackawanna Iron & Steel Co., Republic Iron & Steel Co. and the Colorado Fuel & Iron Co. They say there is not the slightest truth in the reports as regards the immediate future, although it is, of course, natural to look for the purchase eventually of some of these smaller companies by the big organization. It is considered more likely that the Colorado Fuel & Iron Co. will be absorbed than either of the other two companies mentioned. The Colorado Fuel & Iron Co. is controlled by John D. Rockefeller, who is in position to turn over control at any time.

It is officially announced that the Holland-American Line have entered into an agreement with the Marconi company to have their New York steamers, six in number, equipped with Marconi's system of wireless telegraphy. Thus, with the exception of the White Star Line, all the principal passenger steamers on the New York run are now fitted with wireless telegraphy.

### SHIP BUILDING IN OCTOBER

The government bureau of navigation reports seventy-eight sail and steam vessels of 14,024 gross tons built in the United States and officially numbered during the month of October, as follows:

Districts.	Wood.				Steel.				Total.	
	Sail.		Steam.		Sail.		Steam.			
	No.	Gross.	No.	Gross.	No.	Gross.	No.	Gross.	No.	Gross.
Atlantic & Gulf.....	33	9,726	18	721	1	331	1	1,197	53	11,975
Porto Rico.....	1	7	6	1,222					7	1,229
Pacific.....										
Hawaii.....										
Great L'k's.....	1	28	6	156					7	184
Western Rivers.....			11	636					11	636
Total.....	35	9,761	41	2,735	1	331	1	1,197	78	14,024

The largest steel vessel included in these figures is the steamer Elizabeth of 1,197 gross tons, built at Wilmington, Del., for the Central Railroad of New Jersey, and the largest wooden vessel is the schooner Jane Palmer of 3,138 gross tons, built at Boston for Wm. F. Palmer.

### LAUNCH OF THE BATTLESHIP NEW JERSEY

All preparations have been made for the launch today (Thursday) of the battleship New Jersey at the works of the Fore River Ship Building Co. near Boston. The vessel is to be christened by Mrs. Wm. B. Kinney, daughter of Governor Murphy of New Jersey. Governor Murphy and members of his staff, Governor Bates and other officials of Massachusetts, as well as representatives of the navy department will be among those to witness the launching. The New Jersey is one of five battleships provided for by congress in 1899 and 1900. She is of 15,000 tons, and is expected to attain a speed of 19 knots by means of twin screws, propelled by two 4-cylinder triple-expansion engines of about 19,000 I. H. P. Her main battery consists of four 12-in., eight 8-in. and twelve 6-in. rapid-fire guns.

Signor Marconi, the inventor of wireless telegraphy, is thus quoted in a Washington despatch of recent date: "No matter where a British warship may be on the Atlantic ocean or in the Mediterranean, the British admiralty can communicate with it at any moment. Eighty of the British warships, including all of the principal vessels of the home, the Mediterranean and the channel fleets, are equipped with my long-distance wireless apparatus. No matter where these vessels may be, they are constantly within reach of the British admiralty. The British government is installing this system as rapidly as possible on all of its vessels. A long distance wireless communication between England and her most important fortress, Gibraltar, has been in uninterrupted service for many months, despite the fact that besides crossing the English channel the messages traverse a thousand miles of Spanish territory."

Two workmen were killed and two others severely injured at the works of the Fore River Ship Building Co. on Wednesday last by being crushed beneath an oil barge of 160 ft. length that dropped from the keel blocks. The barge is being built for the Standard Oil Co. The accident occurred while tests with water were being made in different compartments of the vessel. From eighty to a hundred men were at work about the barge when the accident occurred and it is remarkable that out of this number but two should be killed and two seriously injured. The vessel dropped about 4 ft. 6 in. from the keel blocks on to the ground but was not seriously injured and may be raised again without great difficulty.

### STILL LARGE SHORTAGE IN LAKE COMMERCE

More than five and a half million tons of freight was moved through the canals at Sault Ste. Marie in October (a full million tons more than in October of last year) but still the total movement for the season to Nov. 1 is 5,706,244 tons less than on the same date in 1903. The aggregate to Nov. 1 this year is 25,667,541 tons, as against 31,369,785 tons to Nov. 1, 1903. The principal shortages are bituminous coal, 1,378,561 tons; anthracite, 215,213 tons; iron ore, 4,404,454 tons wheat, 12,030,436 bu.; flour, 2,233,441 barrels. Full summaries of the canal commerce (Canadian and American) follow:

#### MOVEMENT OF PRINCIPAL ITEMS OF FREIGHT TO AND FROM LAKE SUPERIOR.

Items.	To Nov. 1. 1904	To Nov. 1. 1903	To Nov. 1. 1902
Coal, anthracite, net tons.....	818,998	1,034,211	124,608
Coal, bituminous, net tons.....	3,818,694	5,197,255	3,904,677
Iron ore, net tons.....	16,134,123	20,538,577	21,524,409
Wheat, bushels.....	29,426,156	41,456,892	55,415,585
Flour, barrels.....	3,212,596	5,446,037	7,186,217

#### REPORT OF FREIGHT AND PASSENGER TRAFFIC TO AND FROM LAKE SUPERIOR, FROM OPENING OF NAVIGATION TO NOV. 1 OF EACH YEAR FOR THREE YEARS PAST.

EAST BOUND.			
Items.	To Nov. 1. 1904	To Nov. 1. 1903	To Nov. 1. 1902
Copper, net tons.....	88,417	91,658	97,026
Grain, other than wheat, bushels.....	20,179,276	20,223,381	15,042,054
Building stone, net tons.....	25,811	14,790	35,804
Flour, barrels.....	3,212,309	5,445,977	7,186,207
Iron ore, net tons.....	16,134,123	20,538,577	21,524,409
Iron, pig, net tons.....	36,744	20,716	11,878
Lumber, M. ft. B. M.....	782,710	857,325	955,757
Silver ore, net tons.....	1,313		1
Wheat, bushels.....	29,426,156	41,456,892	55,415,585
Unclassified freight, net tons.....	81,324	81,936	112,009
Passengers, number.....	18,815	27,671	28,988

WEST BOUND.			
Items.	To Nov. 1. 1904	To Nov. 1. 1903	To Nov. 1. 1902
Coal, anthracite, net tons.....	818,998	1,034,211	124,608
Coal, bituminous, net tons.....	3,818,694	5,197,255	3,904,677
Flour, barrels.....	257	60	235
Grain, bushels.....	5,541	3,998	13,627
Manufactured iron, net tons.....	151,768	142,105	156,385
Salt, barrels.....	329,882	362,407	382,519
Unclassified freight, net tons.....	490,783	462,323	513,131
Passengers, number.....	17,602	26,686	27,723

#### SUMMARY OF TOTAL FREIGHT MOVEMENT IN TONS.

	To Nov. 1. 1904	To Nov. 1. 1903	To Nov. 1. 1902
East bound freight of all kinds, net tons.....	19,333,202	24,474,555	26,174,927
West bound freight of all kinds, net tons.....	6,330,339	6,895,230	4,758,286
Total freight, net tons.....	25,663,541	31,369,785	30,933,213

Total number of vessel passages to Nov. 1, 1904, was 13,874, and the registered tonnage, 19,674,590.

### AROUND THE GREAT LAKES

Capt. Chauncey J. Henderson, aged sixty-nine years, who followed the lakes from boyhood, died recently at Belleville, Ont.

Receipts of coal at the port of Milwaukee for the season to Nov. 1 show a decrease of 271,984 tons, as compared with the same period in last year.

Canada's new lake cruiser, the Canada, will be sent to West Indian waters for the winter where her crew of about ninety men will be carefully drilled.

A Buffalo dispatch reports a contract placed by the Point Abino Sand Co. with the Erie Basin Ship Building Co. for a sand sucker of about 400 yds. capacity and to cost \$35,000.

Capt. O. M. Anderson has been appointed successor in Milwaukee to F. D. Rumsey, assistant shipping master of the Lake Carriers' Association, who was accidentally killed at that point several days ago.

The large steel freight steamer to be built by the American Ship Building Co. on an order recently placed by Mr. Samuel Mather of Cleveland will be owned by the Mesabi Steamship Co., incorporated in Ohio last week.

The north light vessel on the Lime-Kiln crossing has been moved about 250 ft. northerly from its former position where it will still mark the westerly edge of the channel in use. This change is made on account of progress in the work of improving the crossing.

It is more than probable that the schooner D. R. Martin, owned by L. S. Sullivan of Toledo and which was stranded on Devil's Island, Georgian Bay, last week, will prove a total loss. The Martin is a schooner of 326 tons, built in 1857 and had been employed in the lumber trade.

Capt. Joseph Kidd, marine surveyor of Duluth, recently received the model of a hatch cover which he has designed. The cover is much like those of the steel kind used on the big freighters Augustus B. Wolvin and Sahara, but is said to be an improvement in many respects over the first devices of this kind.

Strandings of steel vessels on the lakes, often apparently not of special account, result in large repair bills after dry docking. Quite an important bottom damage job has just been completed on the steamer G. A. Flagg, one of the Hanna fleet, at the West Superior dock of the American Ship Building Co.

At a meeting of the executive committee of the Lake Carriers' Association in Cleveland Monday the question of obstructions in the way of bridge abutments, etc., in the Cleveland harbor was taken up and a resolution adopted agreeing to aid the city officials in every way possible to improve the condition of the harbor. This move is due, of course, to the increased size of the new vessels on the lakes.

William W. Mills, who has been known in connection with the management of the Tonawanda Iron & Steel Co.'s fleet of wooden vessels, will have charge of the building and operation of the large steel freighter for which a contract was placed with the American Ship Building Co. several days ago by the Niagara Transit Co. of North Tonawanda, N. Y. Some of the stockholders of the Niagara Transit Co. are officials of the Tonawanda Iron & Steel Co.

As an indication of the desire of the steel works to get down as much ore as possible this season, in view of probable improvement in the iron market, it is noted that vessels of the Tonawanda Iron & Steel Co.'s fleet, which have been in ordinary for some time past, are again being placed in commission. Six of the Tonawanda vessels have just been started for ore after having been tied to the dock for some weeks, and the remainder of the fleet will probably be in commission again before navigation closes.

### THINKS WELL OF ERIE CANAL ESTIMATES

Editor Marine Review:—I have just received copy of your issue of Oct. 27 containing an item in which reference is made to an alleged statement of mine concerning the work of improving the Erie canal. The reporter with whom I talked got an erroneous impression of what I intended to convey. I made no such statement that the estimate of \$101,000,000 was merely nominal and that it would be necessary to spend \$9,000,000 experimentally before the exact cost of the canal can be determined. Of course the exact cost of the canal can only be determined by building it and paying for it. The idea which I wished to convey was that the different sections of the work for which plans and specifications have been prepared, and which are typical of the entire work, will when advertised and offered for contract furnish a test of the adequacy or inadequacy of the estimates of \$101,000,000. Those estimates were most carefully and liberally made and I believe will be found fully adequate for this work.

THOMAS SYMONS,

Lieut. Col. Corps of Engineers, U. S. A.

Albany, N. Y., Nov. 3, 1904.



**IMPROVEMENT IN IRON—BRIGHTER OUTLOOK**

It would seem that the season of lake navigation now nearing an end is about to close in the best possible manner for the vessel owners, as well as the shippers of iron ore and coal, which are the principal lake commodities. Improvement in the pig iron industry, which is of course the basis for all iron and steel lines, has reached the stage where conservatism is being preached on account of the fear of marking prices up too rapidly, and a leading representative of the largest soft coal interest in the country announces that his company is turning down, on account of inability to take care of it, a large volume of "spot" business for which a scramble would be made a few weeks ago. The advance in pig iron prices is particularly significant.

The importance of this improvement from the standpoint of the lake vessel does not apply to the few cargoes that may be carried before the present season is closed. Possibly in trying to protect furnaces that have not fully covered ore requirements into next year the shippers may be compelled to pay a dollar or more freight on a few cargoes when the snow storms set in, notwithstanding the absence of serious competition from grain; but such charters, if they are made, will be of far less importance than the effect of a strong closing situation on the business of another year. The present improvement comes at the right time—at the end of a season that has been the shortest in many years; so short, in fact, that the amount of ore moved will be 4,000,000 tons less than in the previous year and 7,000,000 tons less than in 1902. Similar shortages will appear in coal and in other items of freight. If, then, the improvement that has taken hold in iron and steel is to be followed in other lines it is not reasonable, in view of the figures quoted, to look for surplus stocks in the lake region next spring. Such are the reasons for looking with satisfaction upon conditions attending the closing of the present season. They will enable the ore and coal dealers to demand better prices for another year, and of course the vessel owner may hope to share in the general higher level.

The rate on iron ore from the head of Lake Superior advanced on Tuesday of this week to 75 cents, and it is now quite certain that instead of trying to clean up their business early in November the ore shippers will work to their fullest possible capacity while weather conditions permit.

**IMPORTANT LEASE OF COAL PROPERTIES**

The Pittsburg Coal Co., well known throughout the lake region on account of its very large shipments of soft coal to the northwest from docks on Lake Erie that are under its control, has recently leased from the Wabash railway a tract of high-class coal lands near Pittsburg that has just been brought up to the point of very heavy production. In September last, the Wabash bought the belt line railway and mines of the Pittsburg Railway Terminal & Coal Co., represented on the lakes by Mr. Frank Osborne of Cleveland. Various rumors have been in circulation as to what disposition the Wabash would make of the mines. It was first said that they would be operated by the railway company; then there was a report of a lease to M. A. Hanna & Co., and later it was said that Jones & Adams would handle the coal in conjunction with the railway company. It is now officially announced, however, that the lease goes to the Pittsburg Coal Co. for a long term of years on a royalty said to be 10 cents a ton, which would mean \$300,000 on the estimated yearly output of 3,000,000 tons. A very large portion of the coal is marketed in the lake region. It is generally believed that by this deal the Wabash seeks in addition a part of the tonnage of the Pittsburg Coal Co. originating at points now reached by the Pennsylvania, Baltimore & Ohio, and Pittsburg & Lake

Erie railroads, which have been hauling for the coal company an output varying from 15,000,000 to 17,000,000 tons annually.

**CHICAGO GRAIN REPORT**

Chicago, Nov. 9.—The shipping demand of the past week has been fairly satisfactory as regards well-located cargoes, but the activity in ore, especially desirable Lake Superior business, has been more attractive to the vessels. As the contract corn, that is old corn, has been moved out quite extensively, a better movement of the new crop is now looked for, and much of it will likely go by way of Lake Erie before the season closes. Rates held steady at 13½ cents on corn to Buffalo with Montreal nominally 3¼ cents. Only the regular lines have been engaged in the latter trade as the Canadian general freighters are fully occupied with Fort William business. Shipments of the week were thus distributed: All-rail lines, 348,000 bu. of wheat, 110,000 bu. of corn, and 540,000 bu. of oats; by lake to Buffalo and other American ports, 215,000 bu. of wheat, 440,000 bu. of corn, and 360,000 bu. of oats; by lake to Canada points, 175,000 bu. of corn and 200,000 bu. of oats.

Following is a summary of lake and rail shipments of Chicago grain:

	This week.	Last week.	Same week last year.
Wheat, bu.....	564,037	433,989	498,462
Corn, bu.....	726,465	1,105,462	2,172,901
Oats, bu.....	1,110,177	1,211,775	1,354,457
Rye, bu.....	199,637	301,518	106,361
Total, bu.....	2,590,316	3,052,744	4,132,181

	Shipments since Jan. 1, 1904.	Same time last year.
Wheat, bu.....	14,293,307	19,793,083
Corn, bu.....	64,020,346	81,838,486
Oats, bu.....	40,649,846	56,656,713
Total, bu.....	118,963,499	158,288,282

The stock of grain in Chicago elevators are thus reported for different periods:

	This week.	Last week.	Same week last year.
Wheat, bu.....	4,342,000	4,510,000	5,464,000
Corn, bu.....	1,223,000	1,755,000	4,321,000
Oats, bu.....	9,844,000	9,805,000	2,741,000
Rye, bu.....	650,000	701,000	260,000
Total, bu.....	16,059,000	16,771,000	12,786,000

**ORE OUTPUT MORE THAN TWENTY MILLIONS**

As the ore shippers of the lakes will move all the ore that can possibly be moved during the balance of the season of navigation, it is now more than probable that the total output, lake and rail, from the Lake Superior region for the year 1904 will be a little in excess of 20,000,000 gross tons, compared with 24,281,595 tons last year and 27,571,121 tons in 1902.

Complete reports from upper lake shipping docks show an output to Nov. 1 of 17,659,159 tons, as against 22,383,350 tons on the same date a year ago. October shipments broke all records with an aggregate of 4,034,721 tons, which is fully a million tons more than was shipped in October, 1903.

The first announcement this year of improvements and enlargements in ore shipping docks on Lake Superior comes from the office of the Duluth, Mesabi & Northern Railway. This company's dock No. 3 at Duluth will be enlarged so as to have in all 384 pockets. The entire structure will be raised 14 ft. It is also said that the railroad company will purchase for next year's business 800 new steel ore cars and six engines.

## CANADIAN SHIPPING NOTES

Two tugs are under construction at Vancouver, B. C., one 60 ft. long for sea service, and the second 45 ft. long for river work.

W. Thompson of Orillia, Ont., has placed an order with Davis & Sons, Kingston, Ont., for a steamer 82 ft. long and 16 ft. beam.

The Rideau Lakes Navigation Co., Kingston, Ont., is figuring on two new steamers for its fleet, and will give the Rideau King a thorough overhaul.

The Kawartha Lakes Navigation Co.'s steamer Greyhound is to be remodeled at Lindsay, Ont., during winter, and fitted to carry both passengers and freight.

The Thousand Islands Park Association is taking up the question of deepening the St. Lawrence channel and has a petition to congress in course of signature.

The steamer Turbinia has not been chartered to go to Florida for the winter season, as was anticipated, and arrangements are being made to lay her up at Hamilton, Ont.

The Canadian Pacific Railway Co. is about to have built in Great Britain two large steamers for its Atlantic fleet. A. Piers, the general superintendent, has left Montreal for Liverpool, to arrange the contracts.

The New Westminster (B. C.) city council proposes to dispose of its ferry steamer Surrey, which has been put out of business by the opening of the bridge over the Fraser river, built by the British Columbia government.

The Star Line Steamship Co. has purchased the steamer Pokanoket at Philadelphia, Pa., for the river trade between St. John and Fredericton, N. B., to replace the David Weston, burned. The price paid is reported to be \$25,000.

Capt. P. McGlade proposes to build a steamer at Kingston, Ont., to run between Kingston, Gananoque, Ont., and possibly Clayton, N. Y., and Capt. A. E. Foster of Smiths Falls, Ont., is having a new steamer built for the Rideau Lakes trade.

A. Larschelle, pilot, has been fined \$100 for negligence in connection with the loss of the Tordenskjold on White Island reef, Sept. 30, and M. Lachance has his pilot's certificate cancelled for negligence in his navigation of a steamer Sept. 14. Both are Quebec pilots.

The Vancouver Tug Boat Co. has been incorporated under the B. C. companies' act with a capital of \$15,000 to engage in a general towing business on the Pacific coast. The chief offices are to be at Victoria, B. C., but it is also proposed to obtain a Washington state charter.

The Dominion fisheries protection cruiser Vigilant, for service on the great lakes, has been completed at the Polson Iron Works, Toronto, and given a trial recently. Her contract speed is 16½ knots an hour, but she is capable of making 17 to 17¼ knots. The Canada, illustrated in a recent issue of the Review, is for service on the Atlantic and St. Lawrence gulf only.

The Lake Winnipeg Transportation Co., Ltd., has been incorporated at Winnipeg, Man., with a capital of \$20,000 and offices at Selkirk, Man., to carry on a general navigation business on Lake Winnipeg. J. K. McKenzie, R. Smith, F. W. R. Coleleugh, Selkirk, Man.; M. J. Dee and G. A. Davis, Detroit, Mich., are the directors.

The minister of marine has given instructions that buoys, lights and other aids to navigation on the upper lakes and Georgian bay are to be maintained in operation until the middle of December. If the ice-breaking steamers on the St. Lawrence river and gulf are successful in keeping an open waterway there one or more will be built for use on the upper lakes.

The first ice-breaking steamer, named the Champlain, reached Quebec recently. Dimensions are: Length, 120 ft.; beam, 30 ft.; depth of hold, 17 ft. 6 in.; draught, 11 ft.;

freeboard, 8 ft.; gross tonnage, 522 tons. She is heavily built of steel and equipped for ice work. Her speed is 11 knots an hour. Accommodation is provided for first and second class passengers.

The Polson Iron Works Co., Toronto, has begun the construction of a hydraulic suction dredge for the Dominion government. The dredge is being constructed on similar lines, and will be practically the same size as the J. Israel Tarte, which was built at the same works in 1902. The hull is expected to be ready for launching before ice forms and the dredge will be completed ready for work in the spring.

The question of running steamers for excursions on Sundays is an important one in Ontario, and several prosecutions have taken place under the provincial Sabbath day observance act. On account of the uncertainty of its working the Dominion government is submitting a series of questions to the courts, with a view of having it decided what the powers of the provinces and of the Dominion are on the matter.

The annual report that an opposition line of steamers to those of the Richelieu & Ontario Navigation Co. is to be organized, has come up again. It credits the New York Central railway with having secured the Folger steamers, now running on Lake Ontario and the St. Lawrence river, and with proposing to add to the fleet a sufficient number of steamers to give a service from Niagara to Montreal, touching at various Canadian ports; and a second rumor credits a Quebec firm, representing United States capitalists, with being about to organize a line from Montreal to Quebec. At the present time there is little more than report in the projects.

## BUCYRUS SHOVELS FOR PANAMA

One of the officials of the Bucyrus Co., South Milwaukee, Wis., gives some particulars of the eleven steam shovels for which an order was received from the Panama Canal Commission a few days ago, after competitive bidding, and adds that the Bucyrus company also received without competition, early in August of this year, an order for three 75 and 95-ton shovels, so that they are to furnish all the Panama excavating machinery thus far ordered. The three shovels contracted for in August have been shipped and are being erected on the canal zone. Of the eleven shovels ordered recently five are to weigh from 65 to 70 tons and six from 90 to 100 tons, and they are to be shipped from New York at intervals of thirty days after the award of contract. The batch of five are to be of the standard Bucyrus 70-ton type. These machines are widely known among contractors and railroads as embodying the latest improvements in excavating machinery. They are of all-steel construction and handle a 2½-yd. heavy rock dipper. They are able to excavate and load ordinary material at the rate of about 4,250 yds. per day of ten hours. The 95-ton shovels (six of them) will have 5-yd. dippers. Machines of this kind are used chiefly in handling iron ore on Mesabi and Gogebic iron ranges where heavy shovels of high capacity are in demand. They are also used by a number of the western railroads. The Bucyrus 95-ton shovel is a larger and more powerful machine than any now in the market. It has actual records of handling material at the rate of 8,180 yds. per day of ten hours. This record includes all delays incurred by moving the shovel up to its work, setting the jack arms, etc., and under ordinary conditions and proper facilities for transporting the excavated material could be maintained for indefinite periods. The Bucyrus Co. ships these machines to New York, knocked down, boxed and crated for ocean shipment. They are transported to the canal zone by the Isthmian Canal Commission and there set up and operated during a test period under the supervision of the Bucyrus Co.

## THE LATEST BRITISH SHIP YARD

Glasgow, Nov. 2.—The completion of the latest and most efficient ship building yard in the world, in the "hub" of the world's ship building, cannot fail to be interesting to your readers who are so much interested in the development of shipbuilding. On the Clyde that development is marked by the construction of the new ship yard and engineering works of William Beardmore & Co. in immediate proximity to the renowned establishment of John Brown & Co., Clydebank, and about eight miles west from the city of Glasgow. Four years ago Beardmore & Co. acquired the business of the historic firm of Robert Napier & Sons, whose works were in the outskirts of Glasgow, and one of the oldest ship building concerns in the United Kingdom. Napier's yard, however, was too small for the business Beardmore & Co. are prepared to do, so they acquired a lot of ninety acres near Clydebank, and set to work planning out a big establishment *de novo*,—not one that was to begin small and grow. Hence the striking character of the new outfit, in place of the old Napier yard and engine shops, now advertised for sale.

The site of the new works covers an area of ninety acres, and with a frontage of 4,920 ft. extends backwards from the Clyde to the line of the Lanarkshire and Dumbartonshire railway, from which sidings are laid into the yard for the delivery of material from all parts of the country. The ship building berths at the east side of the yard, cover an area of fourteen acres, and are so planned that vessels will be launched up the waterway and at an angle to enable them to be brought into line with the channel very easily. On two of the berths vessels up to 1,000 ft. in length and 100 ft. in breadth can be built, and for ships of such enormous size there is safe launching room as the length of run in deep water is 1,500 ft. The ground on which the building berths have been arranged is comparatively low-lying, and has a natural slope in the required direction. Heavy timber piling has been put in throughout the length of the berths, with special rows and suitable caps, below the keel-blocks, in the position occupied by the ways, and under the bilge-blocks. Near the water's edge, where there will be the maximum thrust when the stern of a vessel first floats in the process of launching, this piling is very close. Along the river, in front of the berths is a cofferdam for a length of 1,500 ft., so that the tidal water will be excluded entirely from the berths. This cofferdam is 17 ft. high and 6 ft. in width, and it is constructed of sheeting on each side, strongly braced internally, and filled with clay. Sluices are arranged for admitting the water to the inside, to make the pressure equal on both sides. A gangway 6 ft. wide runs along the top of the dam from end to end. One of the berths is equipped with an overhead gantry and roofing, the superstructure being 705 ft. long, 135 ft. wide, and 150 ft. high at the end nearest the river. The roofing is entirely of glass to give the maximum amount of light all over the berth. The design of the superstructure and the arrangement of the overhead cranes embrace all that the experience of other builders has proved to be useful and expeditious, giving light on all sides and facilities for dealing with the heaviest lifts. There are on each side of the berth four jib walking cranes, capable of lifting 5 tons each, and having an overhead reach of 30 ft. Each of these cranes travels the full length of the berth on rails supported by the pillars of the shed, and they can be brought together in order to deal with an exceptionally heavy load. There is also a high speed traveling crane, stretching from one side to the other of the berth, and capable of lifting 15 tons. This crane is for lifting weights into the center of the ship, while the jib cranes are at the disposal of the plating or fitting squads engaged on the bottom or shell. Thus, eight squads can be at work on a ship, each having a crane for dealing with material. The angle and plate trucks pass down each side of

the berth with the minimum of obstruction, and the empty wagons pass outside. By these arrangements the minimum of time will be lost while material is being moved.

Near the building berths are the saw mills and timber stores, and at the head of the berths is the iron workers' shed. This shed, which is 900 ft. long and has a width of 130 ft., contains a complete equipment of the best machine tools. Each is driven by its own electric motor, actuated by a controller fitted to the framework so as to allow a clear space all round the machine. Plate edge planers are fitted with reversing motors instead of cross belting. A very fine set of bending tools is installed. They are operated by a motor of 110 H. P., with an independent 35 H. P. motor for raising and lowering the top roll. Lathes are fitted with variable speed motors having a range from 300 to 900 revolutions per minute. The furnaces are specialized from experience gained at Beardmore's Parkhead forge. They are supplied with gas from the producers at the power station, transmission being through pipes 3 ft. in diameter carried on standards at a height of about 30 ft. above the ground. The furnaces are regenerative for both air and gas, the regenerative chambers being placed below the floor level. The furnace for heating angles is 80 ft. long, and that for plates 50 ft. long. The furnace doors are raised and lowered by special hydraulic gear. The scribe boards are laid on permanent floors 1¾ in. thick.

The various machinery shops have a total area of fourteen and three-fourths acres. All have glazed roofs, and the natural lighting is perfect. Machine tools have been installed to deal with plates up to 40 ft. in length, 7 ft. 6 in. in width, and 2 in. in thickness, and with angles and other sections of framing, etc., of correspondingly heavy proportions. The auxiliary departments are located between the fitting-out basin to the west, and the building berths. These include the shops for smiths, plumbers, brass finishers, engineering mechanics, joiners, cabinetmakers, patternmakers, painters, boat builders, and riggers, along with the mould loft, etc. The angle-smithy and beam shed is 210 ft. long, and 130 ft. broad, and is equipped with tools served like those in the iron workers' shed by independent overhead electric travelers. The blacksmiths' shop is 370 ft. long and 110 ft. wide, and is provided with pneumatic, instead of steam, hammers. An arrangement of air ducts, led from a tank connected to air-pressing machinery, supplies the blast to the fires. The plumbers' and sheet-iron workers' shops are in one building, 300 ft. long and 100 ft. wide. Naval and merchant work are divided, as the class of work differs so greatly. There is an extensive general store, considerable importance being attached to the regulation of supply and demand. The ground floor of a building 300 ft. long and 70 ft. broad is used for stores, and the floor above is entirely used as a mould loft, the sides as well as the roof being glazed. The flooring is of white pine 2½ in. thick, and the planks are connected by a hardwood feather. Independent of the general store there is a naval store 120 ft. long and 70 ft. wide, the idea being to separate as much as possible merchant from naval stores. The engineering mechanics' shop has no connection with the larger department devoted to propelling machinery, and occupies the ground floor of a building 250 ft. long by 90 ft. wide, with galleries on all four sides to accommodate the brass finishers. A 10-ton electric traveling crane runs the full length of the mechanics' shop, and there are splendid machine tools in both departments.

At the far eastern end of the yard is a large timber basin, over which is constructed a gantry carrying an electric crane for lifting logs direct from the basin to the sawmill. The mill is a building 300 ft. long by 120 ft. wide. In it is fitted the best of plant by which much manual labor will be dispensed with. Alongside of the mill are two sheds for the



storage of timber, each 850 ft. long by 140 ft. wide. The joiners' and carpenters' shops are between the dock and the berths, in a building two stories in height, 300 ft. long and 160 ft. broad. The upper floor is allotted to cabinetmakers, patternmakers, and polishers, and the ground floor to joiners. At the southwest corner is a tower 70 ft. high by 30 ft. square, carrying a tank holding 12,000 gallons of water in communication with sprinklers, of which there is one to every 100 square feet of floor surface. This system is intended to deal with any outbreak of fire. The sawdust and shavings from the different machines are carried by means of overhead suction ducts and fans to a furnace used for supplying steam for the stoves in which the timber is dried.

The engineering and boilermaking departments, west of the fitting-out basin, are under one roof of five bays, the total area being 233,210 sq. ft., or nearly five and one-half acres. Each of the bays is 720 ft. long, and their collective width is 330 ft. They extend from north to south, and the northern part of all five is utilized for boiler construction, the southern part for the erection of machinery. All the material, such as castings, forgings, and boiler-plates, enter at the center of the shops. The machines in both departments are so disposed that all the material travels from the delivery point towards the extreme ends of the works; all engine material travels south to where the engines are erected, and all boiler material north to where the boilers are erected. Completed engines and boilers are taken from the shops by the south and north lines of railway respectively, to the fitting-out basin, to be put on board vessels by a large cantilever crane. All the bays are traversed by standard-gauged railways, while overhead are powerful electric cranes. The western bay is 50 ft. wide and is for forging work, the engine smithy being located in the southern end, and the department for flanging, etc., in the northern. There is a splendid equipment of pneumatic hammers ranging up to 30 cwt., while flanging machines deal with boiler-plates up to 20 ft. in diameter, with a furnace opening up to 13 ft. wide. The electric cranes in this bay are of 10 tons carrying power. The second bay is for the lighter machine-tools for boiler work in the north end and for engine manufacture in the southern half. The electric overhead cranes are of 25 tons capacity. The central bay, which, like the second is of 60 ft. span, is for the heavier machine-tools, and in it machines are installed for working boiler-plates up to 38 ft. long, 12 ft. 6 in. wide, and of a thickness of 2 in. There are in this and in the second bay special machines for making water-tube boilers. In the engine department the larger lathes have beds 50 ft. and 100 ft. in length, with headstocks 120 in. in diameter; and the planing machines take jobs up to 26 ft. by 18 ft. and 20 ft. by 9 ft. 6 in. by 9 ft. Over the southern half of the central bay is a gallery 50 ft. wide and 340 ft. long, access to which is obtained by three stairways and by hydraulic hoist. This gallery is for the manufacture of brasswork, and underneath it, extending from the south end northwards for about 155 ft. are a tool department and general stores. The fourth and fifth bays, each 80 ft. in width, are for the erection of engines at the southern end and for the building of boilers at the northern end, the area of each part being 28,000 sq. ft. The height from the floor level to the underside of the roof girders is 65 ft. 3 in. and to the crane rails 55 ft. 9 in., while the height from the floor level to the under side of the crane girders is 54 ft., to suit the largest class of machinery. In the two last-named bays are located some of the heavier tools, and overhead in each bay are two 60-ton cranes, which may be joined together for a load of 120 tons. The pattern shop for the engineering department is an entirely separate building two stories in height. In it the machines are ranged along one side, while the pattern benches are on the other, the space between being utilized for the erection of patterns. There

is a gallery over each side for benches, and for light wood-working machinery.

The works are operated entirely by electric power, the first installation of generating plant having a capacity of 2,800 kilowatts. The dynamos are driven entirely by gas engines, collectively of 4,000 B. H. P. The waste products of the gas plant are recovered, and it is anticipated that the sale of the residual productions will cover the working charges of the hundreds of electric motors and electric cranes throughout the establishment. Gas from the producers is utilized in the furnaces for heating plates, frames, etc. Air compressors are installed for working the various pneumatic hammers and for blowing the smiths' fires and the only boilers in the works are three small steam generators, utilized for the pumps, etc., necessary for the auxiliaries in connection with the gas producer plant for working the machinery, automatically charging the producers, and mechanically removing the ashes, etc., from the basin and crane.

The basin in which new vessels are fitted out is 900 ft. long and 360 ft. wide, with a water area of seven and one-half acres. It is constructed mostly of concrete walls, but at the entrance pitched sloping banks have been made, with timber wharves. The piling has been carried along the river bank as far as the ship building berths providing in line with the river a wharf 1,500 ft. long, with sufficient depth of water alongside to enable a vessel to lie afloat at all times. On the west side of the basin nearest to the engineering shops, has been erected a large cantilever crane on the Benrather principle, which is capable of lifting 150 tons, is constructed of angles and bars, and rises to a height of 120 ft. Within it is the rotating pillar of inverted conical section fitted with roller bearings at the base. The transverse cantilever member is 232 ft. The crab for carrying the load runs on rollers on the top of this cross-member, and the weight carried is counterbalanced by iron ballast enclosed in the shorter arm. Tested to a load of 200 tons, the crane is capable of lifting a weight of 150 tons at an outreach of 72 ft.; of 30 tons at an outreach of 140 ft.; and of proportionate loads at intermediate and greater distances from the center of the crane. The outreach of 72 ft. with the 150 tons is practically impossible with ordinary sheers, and can only be reached with extreme difficulty by a jib crane of the ordinary type. By Beardmore's crane twin-screw machinery, or boilers, weighing 150 tons, can be placed at the outer part of a ship with a beam of quite 80 ft. The crane is operated by electricity controlled from a central switchboard room, fitted on the platform at the top—160 ft. above the ground level. The current is carried to the switchboard through heavy armored cables up the rotating pillar and connected at base to the ground conductors by a special form of contact ring. For hoisting there are two 50 H. P. motors fitted in each crab, and these are worked in parallel series by a large tramway-type controller. The longitudinal traverse along the arm is by a 20 H. P. series-wound motor, and cantilever switches are provided for cutting off the current automatically in the event of over-running. The motor for rotating the standard crane and load is of 20 H. P., and is placed on the ground level, where it drives by means of worm-wheel and gearing, the pinion forming the base of the rotating pillar. In addition to the large crane there are at the dock three electric travelers of great height and outreach for dealing with lighter loads, also numerous electrically-operated capstans, drums, and winches for moving ships while in the dock.

It is the intention of the Beardmore company to construct on this site a large graving dock, and then they will have a thoroughly complete establishment, capable not only of completing ships, but of fitting them out and coaling them without requiring to send them up the river. Below this yard the channel is wide and comparatively straight.

This remarkable ship yard practically begins work with an

order which it has received from the admiralty for one of the two new battleships included in the year's naval program. This new battleship will be the most powerful warship ever constructed in the world, so it is a suitable opening for the new establishment. The contract for the other battleship of this, the Lord Nelson class, has been placed with Palmer's Ship Building Co., Tyne.

#### LEBANON CHAIN

The Lebanon Chain Works, Lebanon, Pa., has just completed and shipped to the Brooklyn navy yard two cables of 120 fathoms each, 2 $\frac{3}{4}$  in. diameter iron chain, for the battleship Connecticut. The iron for this large chain was manufactured to special requirements, meeting the most exacting physical and chemical tests, exceeding, in fact, the specifications in many respects. It is well known that the requirements for battleship cable are the most difficult to fill of all wrought iron specifications, but after considerable expense and time the American Iron & Steel Mfg. Co., Lebanon, was successful in furnishing the required quality. Specimens taken promiscuously from the iron gave the following results: Elastic limit, 30,560 lbs. per square inch; tensile strength, 50,550 lbs. per square inch; elongation in 8 in., 38.75 per cent; reduction in area, 47.8 per cent.

The requirements called for a strength of 443,000 lbs. for the finished chain, and a proportionate proof test, whereas samples of three links each taken from the chain broke at 485,000, 502,000 and 513,000 lbs., far above the specifications. In this test the links stretched from 1 $\frac{7}{8}$  to 2 $\frac{1}{2}$  in., with a reduction in area of 15-64 in. The samples referred to, which have given such high results, are on exhibition at the office of the Lebanon Chain Works, where they can be seen and examined by any one interested in high grade chain or iron. The test and inspection were made by R. L. Ogden, government inspector, who has just made a final test and inspection of another suit for delivery to the Newport News Ship Building & Dry Dock Co., Newport News, Va., to equip another battleship. The Lebanon Chain Works has five more suits to manufacture, and the managers feel highly elated over the successful issue of a very difficult task.

#### MOTOR BOAT SHOW

At a meeting in New York on Tuesday last members of the National Association of Engine and Boat Manufacturers were allotted space for the annual motor boat show, which will be held in Madison square garden in February. There was a far greater demand for space than was expected and it was reported that there remains now less than 200 ft. of water space and only about 75 ft. of motor space which will be allotted to early applicants. Members of the association who have taken space and the article they will exhibit follows:

E. H. Gotshalk & Co. (motor and launch); Richardson Engineering Co. (electric lighting outfit); Electric Launch Co. (launches); Gas Engine & Power Co. and C. L. Seabury & Co. (launches); Lozier Motor Co. (motors and launches); Standard Boat Co. (motor and launch); Buffalo Gasoline Motor Co. (motors and launch); Milton Point Shipyard (motor launch); Standard Motor Car Co. (marine motor and launch); Truscott Boat Mfg. Co. (launches); Smith & Mabley (motor and launch); James Craig, Jr. (motor); Pierce Engine Co. (launches); Cushman Motor Co. (motor and launch); Matthews Boat Co. (launch); Spaulding Gas Engine Works (motor and wheels); American De Dietrich Motor Car Co. (motor launch); Racine Boat Mfg. Co. (launches, etc.); Carlyle-Johnson Machine Co. (reversing gears and clutches); The Isham Co. (motors); Smalley Motor Co. (motors); Newbury & Dunham (launch); F. A. La Roche Co. (motors); C. D. Durkes & Co. (marine specialties); William Roche (spark coils, etc.); Chas. F. Splitdorf (spark coils,

etc.); Remy Electrical Co. (spark coils, etc.); C. L. Altemus & Co. (Spark coils, etc.); Palais De L'Automobile (launch); Trebert Gas Engine Co. (motor); Sovereign Gas Engine & Construction Co. (motor); Panhard & Levassor (motor launch); Miamus Motor Co. (motors); Eagle Bicycle Mfg. Co. (motors).

#### READY TO BEGIN NEW YORK CANAL WORK

The board of engineers engaged in compiling estimates and specifications for New York state canals has completed specifications for the first six sections of the work and expects that operations on these sections will be begun before the winter sets in. It will be necessary to advertise the bids for four weeks, but the advertising can be started as soon as the attorney-general approves the form of bond to accompany the contracts. The board consists of Col. A. B. Fry, chief engineer in the United States treasury service; Lieut.-Col. Thomas W. Symons of the army engineer corps; Dr. E. C. Cortell, who was associated with Eads; Edward A. Bond, formerly New York state engineer, and William A. Brackenridge, who engineered the Niagara Falls power terminal. The six sections for which estimates and specifications have been prepared are as follows:

Section 1—For excavating the Hudson river channel from Northumberland to Fort Miller and from Crocker's reef to Fort Edward, construction of Crocker's reef dam and approaches to the head of the land line and other incidental work, 7 $\frac{1}{2}$  miles in all. Board estimate, \$712,823; original estimate \$748,766.

Section 2—Excavation and protection of the sides of the canal on the Mohawk river to a point one-fourth of a mile west of locks, construction of locks 2 and 3, with approaches. Board estimate, \$1,170,036; former estimate, \$1,214,804.

Section 3—Excavation of canal and protection of banks below lock 6 at Fort Miller and its approaches at guard gate above Crocker's reef, construction of lock 6, guard gate and approaches, bridge abutments and foundations, removal and re-erection of bridge at E Street, the change in location of old Champlain canal. Board estimate, \$871,662, as against the original estimate of \$897,000.

Section 4—Construction of canal and appurtenances from the foot of lock 25 to the deep waters at the foot of Oneida lake, 4.83 miles. Board estimate, \$934,444; original estimate, \$938,859.

Section 5—For construction of canal and its appurtenances from near Mosquito point bridge over Seneca river to east of village of Savannah, 5.66 miles. Board estimate, \$484,440; original estimate, \$466,929.

Section 6—Excavations of canal south of Buffalo road, Lyall avenue, Niagara Falls branch of the New York Central Railroad; Lee road and Spear's bridge road and incidental work. Board estimate, \$1,588,912; original estimate, \$1,623,292.

Another of the older class of wooden steamers, the Germanic, has gone out of existence, probably without great regret on the part of the owners, as she was fully insured. The Germanic stranded on Friday last on the head of Stag Island, St. Clair river. While wrecking operations were under way on Sunday morning, the vessel took fire in the machinery end and was completely destroyed, with a cargo of coal. The Germanic was built in 1888 and was owned by Hutchinson & Co. of Cleveland. She was insured for \$40,000.

August, 1906, is the time fixed for completion of the second ship canal at St. Clair flats. Lieut.-Col. Charles E. L. B. Davis, United States engineer in charge of the work, has not been satisfied with progress made recently and has been urging the contractors to increase their plant.

## TRADE NOTES

The Fort Wayne Electric Works, Fort Wayne, Ind., have just issued bulletin No. 1058 devoted to its multiphase revolving field generators, engine driven. It is excellently illustrated and will be sent to anyone interested.

An attractive twenty-four page booklet has been issued by the Joseph Dixon Crucible Co., Jersey City, N. J., devoted to the subject of graphite lubrication for automobiles. Copies of this booklet will be freely sent to any one interested in the operation of motor cars and motor boats. The book is printed on heavy cream colored plate paper and the cover is in two colors.

The C. W. Hunt Co. of West New Brighton, New York, have been particularly successful at the World's Fair, two of their three exhibits securing highest awards, the third not entered. The Hunt "Industrial" railway received the gold medal for narrow gauge railways, and the electric storage battery locomotive built by that company received the silver medal, being the highest award for this type of locomotive.

"The Protection of Steel" is the title of a very beautiful folder that the Joseph Dixon Crucible Co., Jersey City, N. J., has just issued. It presents a view of one of the 15-ft. girders of the Willis avenue bridge over the New York, New Haven & Hartford railway freight yards and the Harlem river, New York city. The view plainly shows the absolutely perfect condition of Dixon's silica graphite paint after four years' exposure.

The Robins Conveying Belt Co., Park Row building, New York, has just issued bulletin No. 10, devoted to their belt conveying machinery. The frontispiece is a wash drawing of the works of the company at Passaic, N. J., and the book is illustrated throughout with photographs of installations of conveying machinery in various parts of the country by the company. Any concern that has much conveying to do will do well to write for this catalogue.

The Grand Rapids Gas Engine & Yacht Co., Grand Haven, Mich., report that they have had a very good year. Among the group of boats turned out by them was a 45-ft. full cabin boat for A. J. Gay of Gay, Fla. This boat was destined for gulf and river work and has proved very satisfactory. The company also completed a speed launch 26 ft. long by 4 ft. beam, which outclassed everything in that section of the country in speed. This launch is not an auto boat as it weighs 1,500 lbs.; nor is it a heavy sea boat. It is equipped with one of the company's 10-H. P. high speed engines. The boat entered into a number of contests, especially one with a 60-ft. speed launch, but beat it 200 ft. in less than a half mile run. The company has recently placed on the market a 17-ft. 3-H. P. family boat at \$250 which has become quite popular.

## BRITISH ADMIRALTY CHARTS

Following is the bi-monthly list of publications of the hydrographic office of the British admiralty, revised to date by J. D. Potter, admiralty chart agent, 145 Minories, London:

## NEW CHARTS.

- 1683 m—England, west coast. Padstow harbor.
- 1919 m—Scotland. Hebrides, Lewis island—Stornoway harbor.
- 3400 m—England. Channel islands—Guernsey, Herm and Sark.
- 3442 m—Lapland. Plans on the north coast of Russian Lapland—Ivanovski bay.
- 3435 m—Sweden. Plans on the east coast—The Narrows of Kalmar sound. Entrance to Gefle. Entrance to Umea.
- 3414 m—France, south coast—Approaches to Marseille.
- 2285 m—Black sea. Varna—Baljik bay.
- 3406 m—Newfoundland, east coast—Bay of Exploits, Sheet 1 (North).

3417 m—British Columbia. Vancouver island—Hanson island and to Beaver harbor, including Broughton strait. Port McNeill.

3431 m—Africa, west coast—Cape Coast Castle to Barako point.

3432 m—Africa, west coast—Barako point to Great Ningo.

3423 m—Africa, west coast—Old Calabar river. Duke town anchorage.

3370 m—Philippine islands—San Bernardino strait and approaches.

3429 m—China, east coast. Hong Kong island—East Lamma channel.

3437 m—Japan. Nipon, west coast—Hagi approaches.

431 m—Australia, west coast—Swan river, North Fremantle to Perth.

1347—Peru. Plans on the coast. Plan added—Huacho anchorage.

632—Africa, west coast. Walfisch bay to Orange river. Plan added—Prince of Wales bay.

3311—Eastern archipelago. Anchorages on the north coast of Java. Plan added—Tegal road.

1023—China, south coast. Boddam cove. Plan added—Nam sha bay.

1256—China, north coast. Gulfs of Pe chili and Liao tung. Plan added—Sketch of entrance and bar of the Yang kiao ko.

Charts that have received additions or corrections too large to be conveniently inserted by hand, and in most cases other than those referred to in the admiralty notices to mariners:

- 1188—The World—Coal and telegraph chart.
  - 34—England, south coast—The Scilly Isles.
  - 1765—Ireland, south coast. Queenstown and port of Cork (outer sheet).
  - 1777—Ireland, south coast. Queenstown and port of Cork (inner sheet).
  - 3384—Ireland, south coast. Queenstown.
  - 2246—Baltic sea. Port Baltic to Hogland.
  - 2694—France, west coast. Channels between Ile d'Ouessant and the Mainland.
  - 2554—Mediterranean sea. Italy—Leghorn roadstead, etc.
  - 2379—Black sea—Kherson or Dniepr bay.
  - 893—Newfoundland. Burin harbor to Devil bay.
  - 761—West India islands and Caribbean sea. Sheet 1.
  - 762—West India islands and Caribbean sea. Sheet 2.
  - 486—West Indies. Jamaica and the Pedro bank.
  - 1274—Gulf of Mexico. Tortugas cays to cape San Blas.
  - 23—Chile—Channels between Magellan strait and gulf of Trinidad.
  - 631—South America, west coast. Smyth channel from south entrance to Fortune bay.
  - 2840 British Columbia—Haro strait and Middle channel.
  - 759a—Madagascar. Cape St. Andrew to Bevato island.
  - 821—Bay of Bengal. Elephant point to Cheduba strait.
  - 833—Bay of Bengal. Rangoon river and approaches.
  - 2153—Malacca strait—Port Swettenham.
  - 928—Sulu archipelago.
  - 2577—Philippine islands. Between St. Bernardino and Mindoro straits.
  - 3283—Philippine islands. Port Salomague and approach Port Suai.
  - 127—Japan—Hirado no seto to Simonoseki strait.
- Charts that have received additions or corrections too large to be conveniently inserted by hand, and in most cases other than those referred to in the admiralty notices to mariners:
- 1674—Australia, east coast—Brisbane river.
  - 2614—New Zealand—Kaipara harbor.
  - 2540—New Zealand. Awarua or Bluff harbor and New river.
  - 3044—Celebes. Ujong Jonga to Ujong kassi.





VOL. XXX.

CLEVELAND, O., NOVEMBER 10, 1904.

No. 19.

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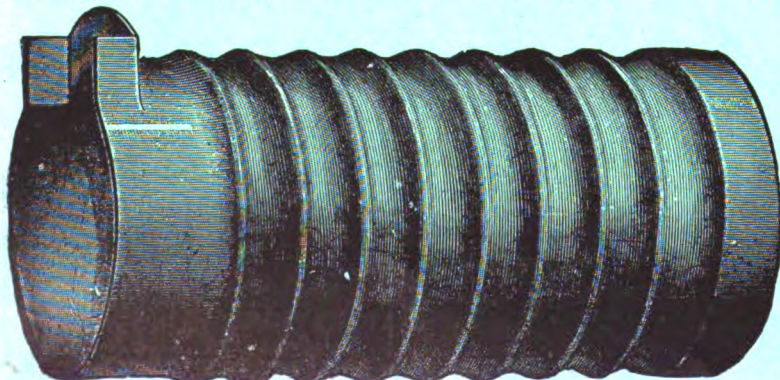
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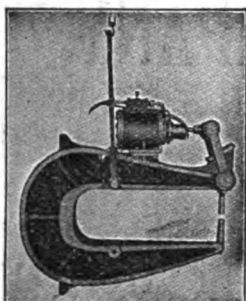
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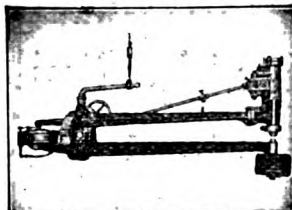
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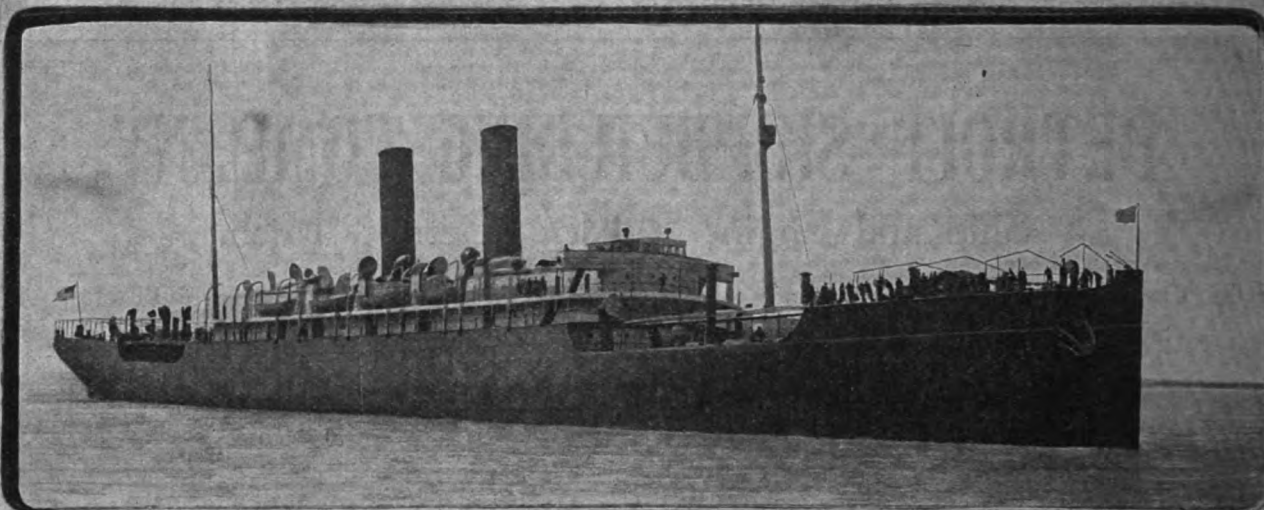
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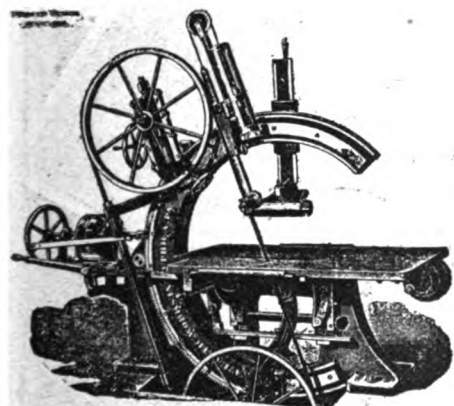
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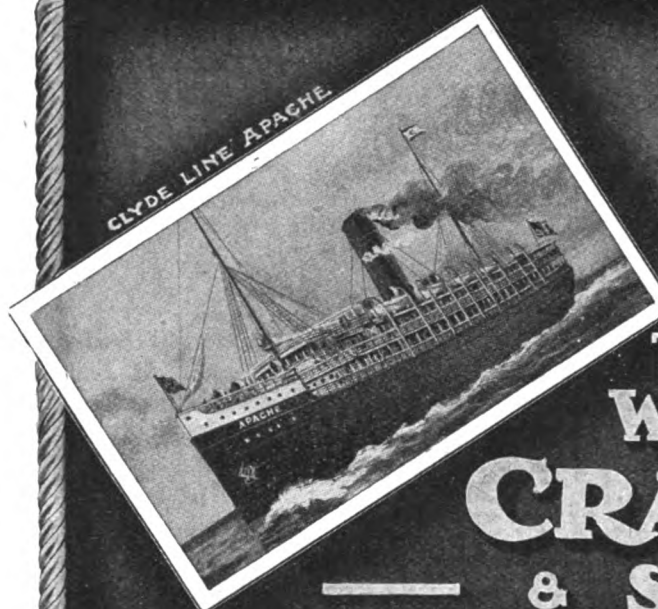
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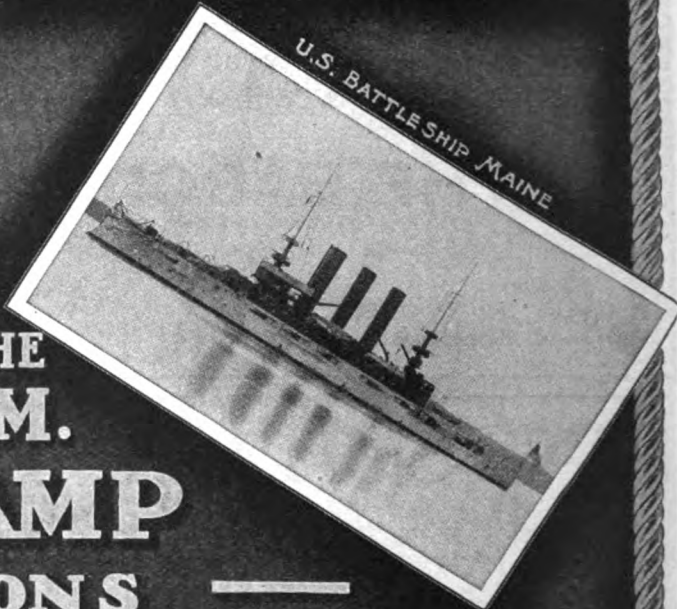
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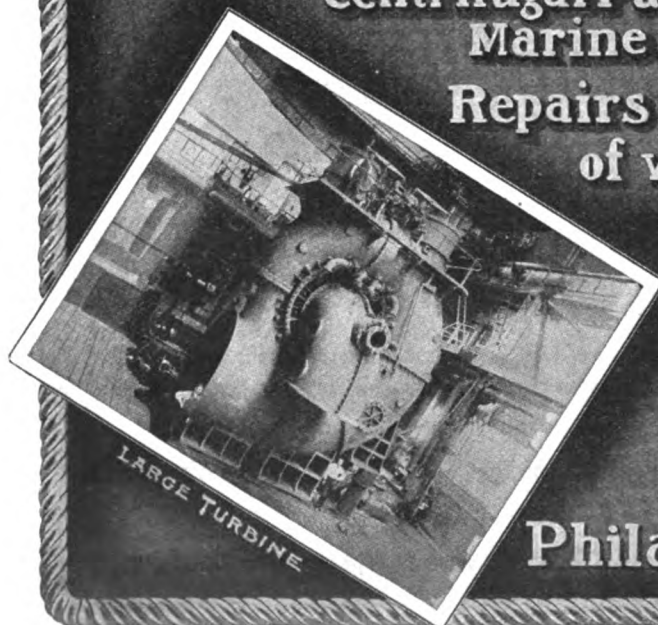


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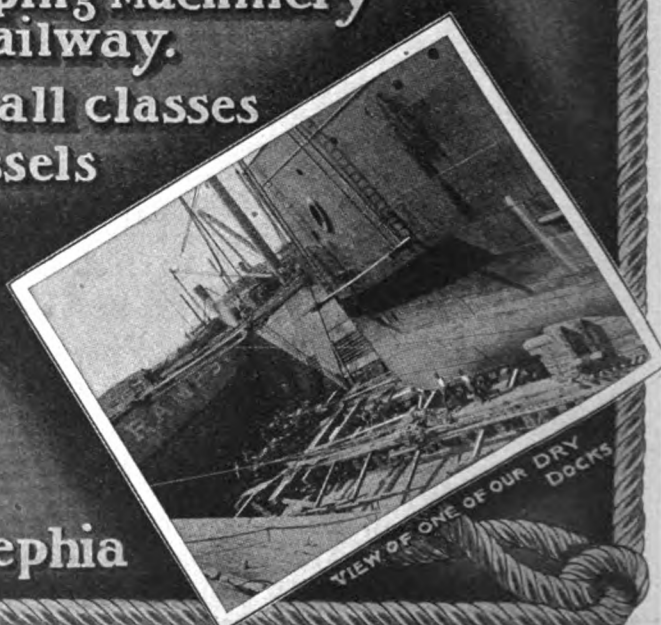
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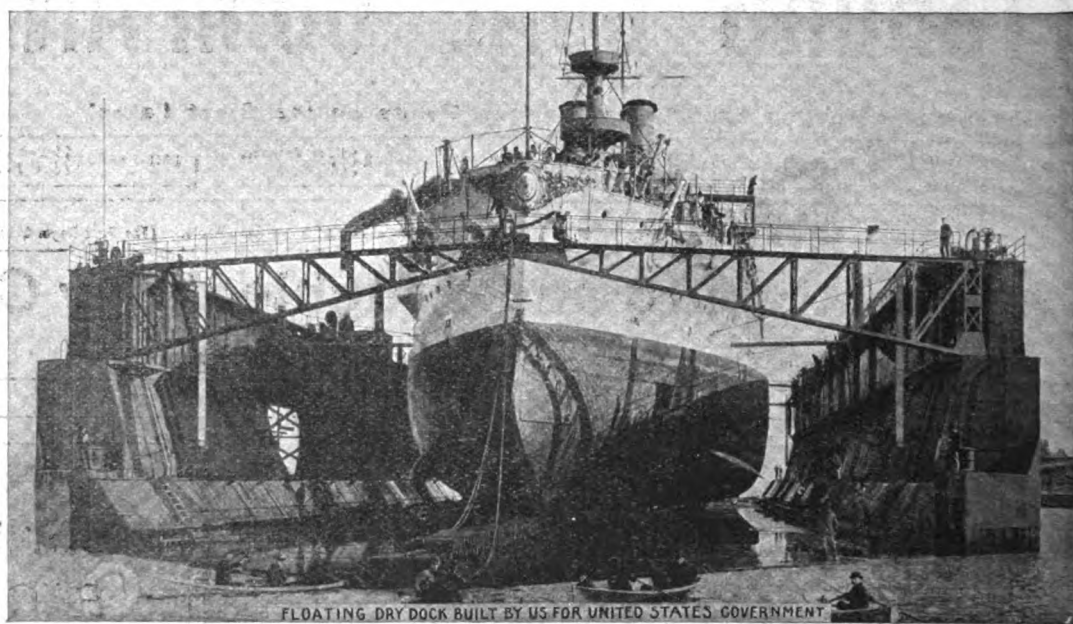
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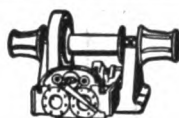
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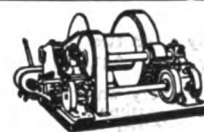
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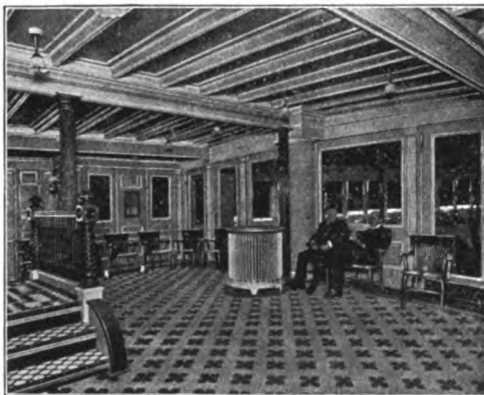
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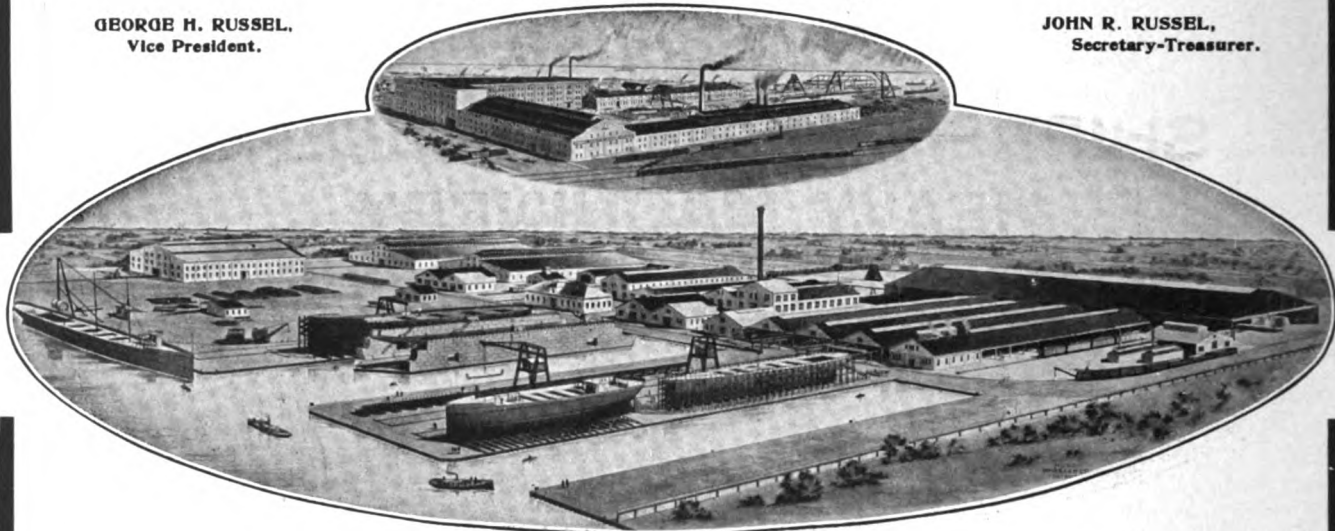
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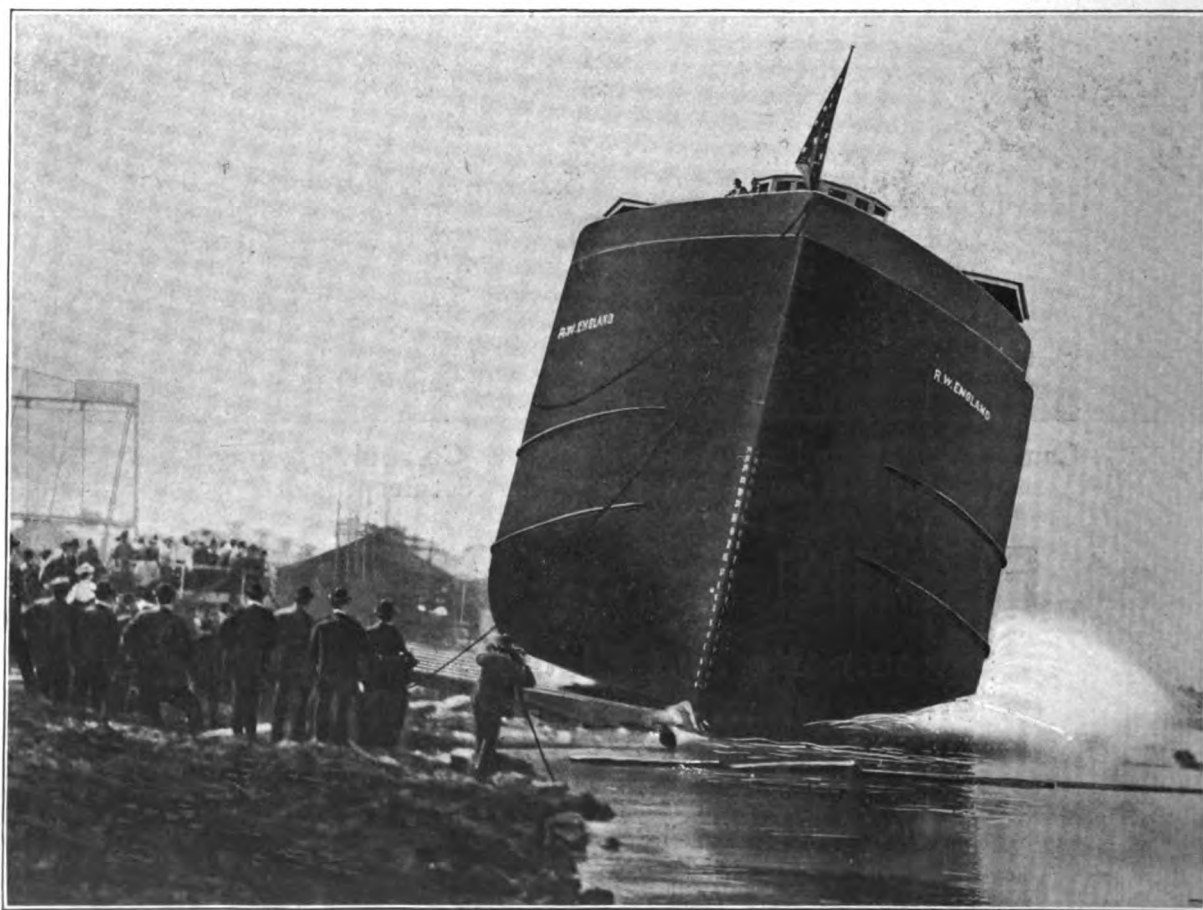
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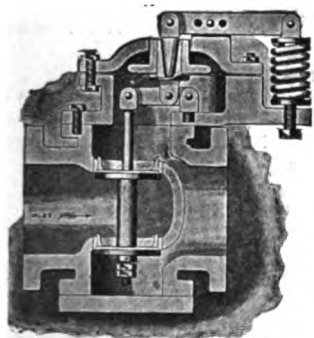
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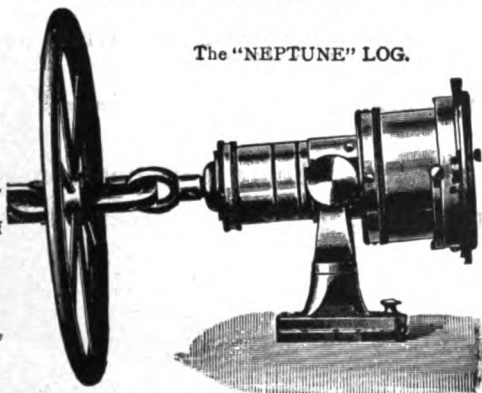
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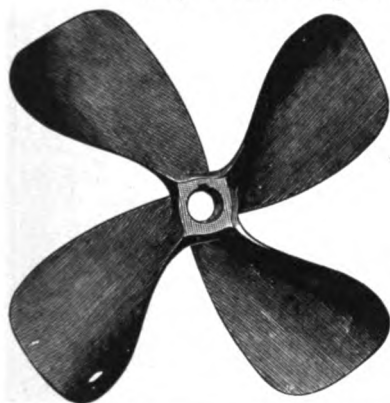
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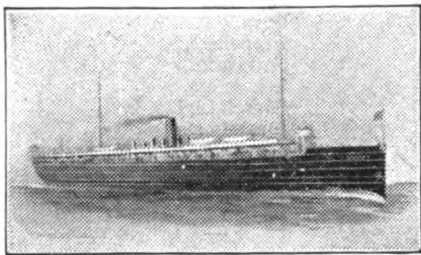
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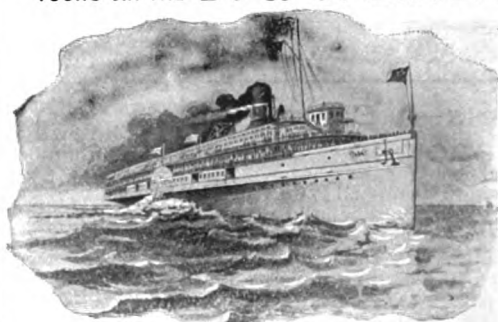
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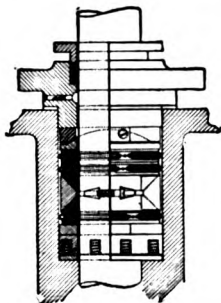


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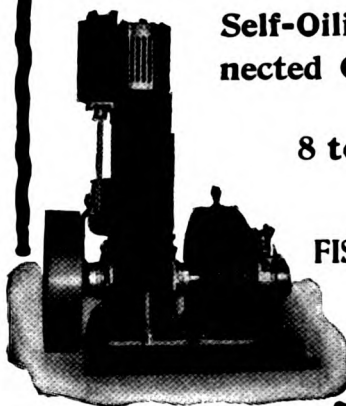
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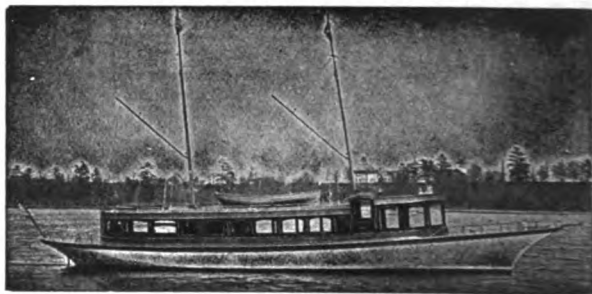
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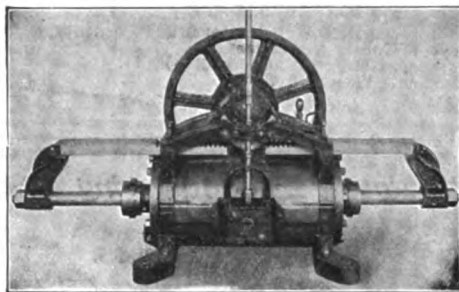
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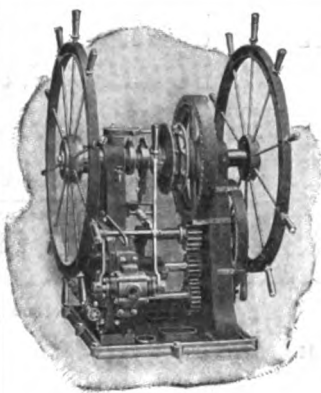


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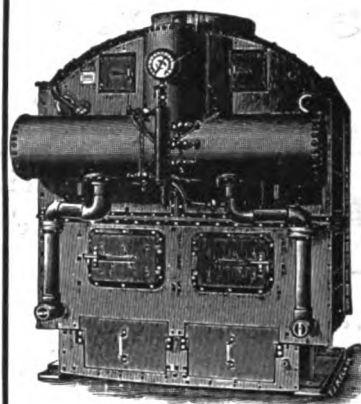
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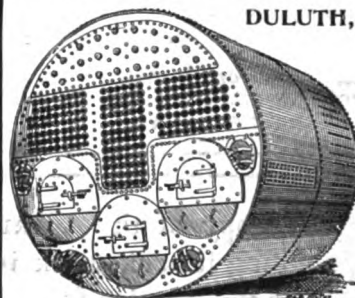
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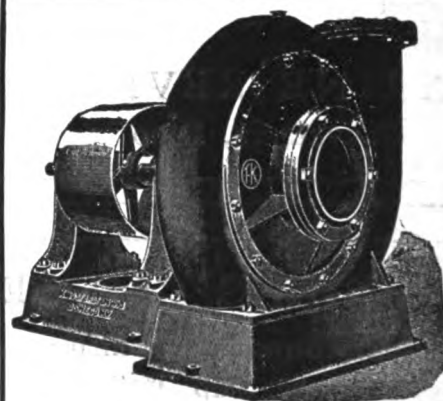
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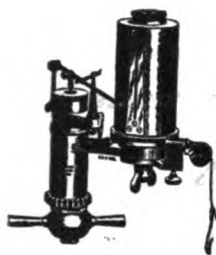


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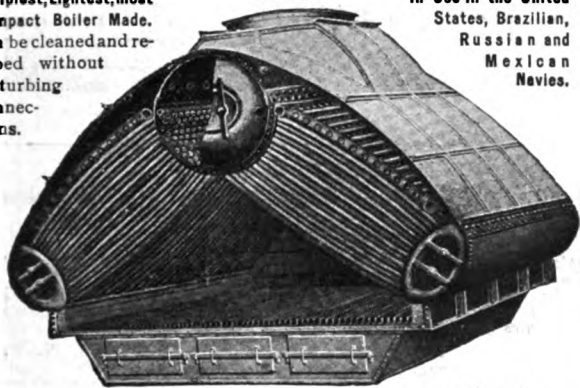
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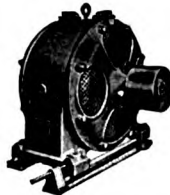
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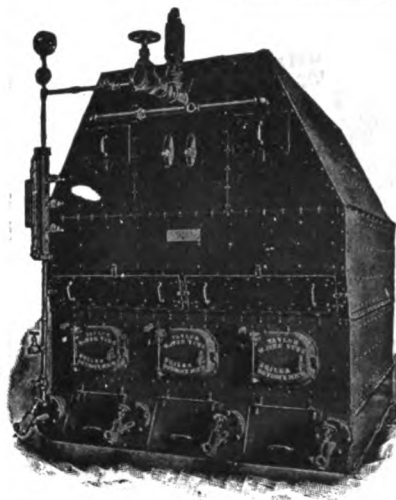
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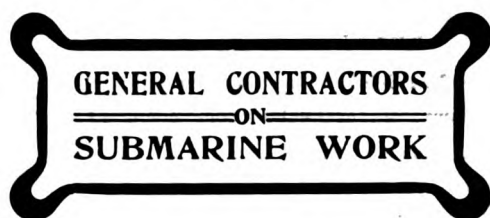
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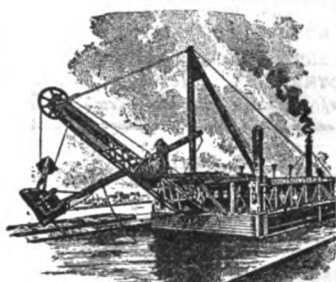
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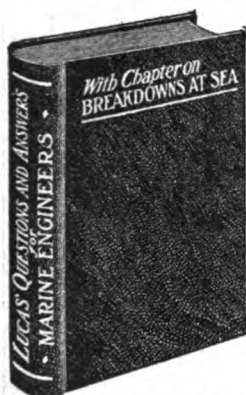


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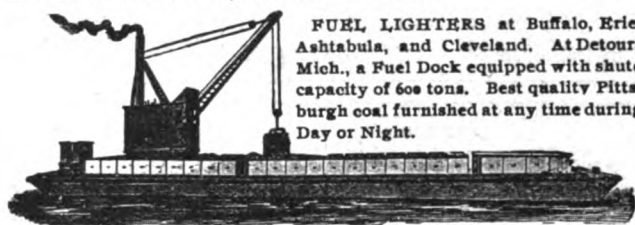
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General Electric Co.....Schenectady, N. Y.  
Mietz, Aug. ....New York.  
Sturtevant, B. F. Co.....Hyde Park, Mass.  
Thropp & Sons, John E.....Trenton, N. J.  
Westinghouse Electric & Mfg. Co.....Pittsburg, Pa.

**ENGINE BUILDERS, MARINE.**

American Ship Building Co.....Cleveland.  
Atlantic Works.....East Boston, Mass.  
Bertram Engine Works Co., Ltd.....Toronto, Can.  
Chicago Ship Building Co.....Chicago.  
Chase Machine Co.....Cleveland.  
Cramp, Wm. & Sons.....Philadelphia.  
Craig Ship Building Co.....Toledo, O.  
Dake Engine Co.....Grand Haven, Mich.  
Detroit Ship Building Co.....Detroit.  
Fletcher, W. & A. Co.....Hoboken, N. J.  
Fore River Shipbuilding Co.....Quincy, Mass.  
Great Lakes Engineering Works Detroit, Mich.  
Hall Bros.....Philadelphia.  
Jenks Ship Building Co.....Port Huron, Mich.  
Lockwood Mfg. Co.....East Boston, Mass.  
Macbeth Iron Co.....Cleveland.  
Maryland Steel Co.....Sparrows Point Md.  
Mietz, Aug. ....New York.  
Milwaukee Dry Dock Co.....Milwaukee.  
Mosher, Chas. D.....New York.  
Moulton Steering Engine Co.....New York.  
Newport News Ship Building Co.....Newport News, Va.  
New York Shipbuilding Co.....Camden, N. J.  
Northwestern Steam Boiler & Mfg. Co.....Duluth, Minn.  
Roach's Ship Yard.....Chester, Pa.  
Sheriffs Mfg. Co.....Milwaukee.  
Superior Ship Building Co.....Superior, Wis.  
Thropp, J. E. & Sons Co.....Trenton, N. J.  
Trout, H. G.....Buffalo.  
Willard, Chas. P. & Co.....Chicago.

**ENGINE ROOM TELEGRAPH, CALL BELLS, ETC.**

Cory, Chas. & Son.....New York.  
Marine Mfg. Supply Co.....New York.

**ENGINE TESTING.**

Kreer & Parsons.....Chicago.

**ENGINEERING SPECIALTIES AND SUPPLIES.**

Crane Co.....Chicago.  
Kieley & Mueller.....New York.  
Lunkenheimer Co.....Cincinnati.  
New York Belting & Packing Co.....New York.  
Northwestern Steam Boiler & Mfg. Co.....Duluth, Minn.

**ENGINEERS, MARINE, MECHANICAL, CONSULTING.**

Hynd, Alexander.....Cleveland.  
Hunt, Robt. W. & Co.....Chicago.  
Kidd, Joseph.....Duluth, Minn.  
Kreer & Parsons.....Chicago.  
Lovejoy, H. O.....Buffalo.  
Matteson & Drake.....Philadelphia.  
Mosher, Chas. D.....New York.  
Nacey, James.....Cleveland.  
Pittsburg Testing Laboratory, Ltd.....Pittsburg.  
Rice, Henry.....Buffalo.  
Roelker, H. B.....New York.  
Sadler, Perkins & Field.....New York.  
Steel, Adam.....Cleveland.  
Wood, W. J.....Chicago.

**FANS FOR VENTILATION, EXHAUST, ETC.**

Sturtevant, B. F. Co.....Hyde Park, Mass.

**FEED WATER PURIFIERS AND HEATERS.**

Reilly Repair and Supply Co., Jas.....New York.  
Ross Valve Co.....Troy, N. Y.

**FIXTURES FOR LAMPS, OIL OR ELECTRIC.**

General Electric Co.....Schenectady, N. Y.  
Westinghouse Electric & Mfg. Co.....Pittsburg, Pa.

**FORGES.**

Sturtevant, B. F. Co.....Boston.

**FORGINGS FOR CRANK, PROPELLER OR THRUST SHAFTS, ETC.**

Cleveland City Forge & Iron Co.....Cleveland.  
Fore River Shipbuilding Co.....Quincy, Mass.  
Macbeth Iron Co.....Cleveland.

**FLUE WELDING.**

Fix's, S. Sons.....Cleveland.

**FUEL ECONOMIZERS.**

Sturtevant Co., B. F.....Hyde Park, Mass.

**FUELING COMPANIES AND COAL DEALERS.**

Hanna, M. A. & Co.....Cleveland.  
Ironville, Dock & Coal Co.....Toledo, O.  
Parker Bros. Co., Ltd.....Detroit.  
Picklands, Mather & Co.....Cleveland.  
Pittsburg Coal Co.....Cleveland.  
Smith, Stanley B., & Co.....Detroit.  
Smith Coal & Dock Co., Stanley B.....Toledo, O.

**FURNACES FOR BOILERS.**

Continental Iron Works.....New York.

**GASKETS, RUBBER.**

New York Belting & Packing Co.....New York.

**GAS BUOYS.**

Safety Car Heating & Lighting Co.....New York.

**GAS AND GASOLINE ENGINES.**

Chase Machine Co.....Cleveland.  
Georgian Bay Engineering Works.....Midland, Ont.  
Reliance Mfg. Co.....Providence, R. I.

**GAUGES, STEAM AND VACUUM.**

American Steam Gauge & Valve Mfg. Co.....Boston.  
Ashton Valve Co.....Boston.  
Lunkenheimer Co.....Cincinnati.  
Standard Gauge Mfg. Co.....Syracuse, N. Y.

**GAUGES, WATER.**

Bonner & Co., Wm. T.....Boston.  
Lunkenheimer Co.....Cincinnati, O.  
Standard Gauge Mfg. Co.....Syracuse, N. Y.

**GRAPHITE.**

Dixon Crucible Co., Joseph.....Jersey City, N. J.

**HAMMERS, STEAM.**

Chase Machine Co.....Cleveland.

**HEATING APPARATUS.**

Sturtevant, B. F. Co.....Hyde Park, Mass.

**HOISTS FOR CARGO, ETC.**

American Ship Building Co.....Cleveland.  
Brown Hoisting Machinery Co. (Inc.).....Cleveland.  
Chase Machine Co.....Cleveland.  
General Electric Co.....New York.  
Georgian Bay Engineering Works.....Midland, Ont.  
Hyde Windlass Co.....Bath, Me.  
Marine Iron Co.....Bay City.  
Mietz, Aug. ....New York.  
Pawling & Harnischfeger.....Milwaukee.  
Westinghouse Electric & Mfg. Co.....Pittsburg, Pa.

**HOLLOW STAYBOLT IRON.**

Falls Hollow Staybolt Co., Cuyahoga Falls, O.

**HOSE, RUBBER.**

New York Belting & Packing Co.....New York.

**HYDRAULIC DREDGES.**

Great Lakes Engineering Works.....Detroit.

**HYDRAULIC TOOLS.**

Watson-Stillman Co., The.....New York.

**ICE MACHINERY.**

Great Lakes Engineering Works.....Detroit.  
Roelker, H. B.....New York.

**INDICATORS FOR STEAM ENGINES.**

American Steam Gauge Co.....Boston.  
Ashton Valve Co.....Boston.

**INJECTORS.**

American Injector Co.....Detroit.  
Crane Co.....Chicago.  
Jenkins Bros.....New York.  
Lunkenheimer Co.....Cincinnati.  
Penberthy Injector Co.....Detroit, Mich.

**INSURANCE, MARINE.**

Elphicke, C. W. & Co.....Chicago.  
Fleming & Co., P. H.....Chicago.  
Frankfort Marine, A. & P. G. Ins. Co.....New York.

**INSURANCE, MARINE—Continued.**

Gilchrist & Co., C. P.....Cleveland.  
Hawgood & Co., W. A.....Cleveland.  
Helm & Co., D. T.....Duluth.  
Hutchinson & Co.....Cleveland.  
McCarthy, T. R.....Montreal.  
McCurdy, Geo. L.....Chicago.  
Mitchell & Co.....Cleveland.  
Parker Bros. Co., Ltd.....Detroit.  
Peck, Chas. E. & W. F.....New York & Chicago.  
Prindiville & Co.....Chicago.  
Richardson, W. C.....Cleveland.  
Sullivan, D. & Co.....Chicago.  
Voss, F. D.....New York.

**IRON ORE AND PIG IRON.**

Bourne-Fuller Co.....Cleveland, O.  
Hanna, M. A. & Co.....Cleveland.  
Pickands, Mather & Co.....Cleveland.

**LAUNCHES—STEAM, NAPHTHA, ELECTRIC.**

Georgian Bay Engineering Works.....Midland, Ont.  
Marine Construction & D. D. Co.....Mariner's Harbor, S. I., N. Y.  
Truscott Boat Mfg. Co.....St. Joseph, Mich.  
Willard, Chas. P.....Chicago.

**LIFE PRESERVERS, LIFE BOATS, BUOYS.**

Armstrong, Cork Co.....Pittsburg.  
Drein, Thos. & Son.....Wilmington, Del.  
Kahnweiler's Sons, D.....New York.

**LIGHTS, SIDE AND SIGNAL.**

Russell & Watson.....Buffalo.

**LOGS.**

Walker & Sons, Thomas.....Birmingham, Eng.  
Also Ship Chandlers.

**LUBRICATING GRAPHITE.**

Dixon Crucible Co., Joseph.....Jersey City, N. J.

**LUBRICATORS.**

Crane Co.....Chicago.  
Lunkenheimer Co.....Cincinnati.

**LUMBER.**

Martin-Barriss Co.....Cleveland.

**MACHINISTS.**

Chase Machine Co.....Cleveland.  
Hickler Bros.....Sault Ste. Marie, Mich.  
Lockwood Mfg. Co.....East Boston, Mass.  
Macbeth Iron Co.....Cleveland.  
Union Machine & Boiler Co.....Cleveland.

**MACHINE TOOLS (WOOD WORKING).**

Atlantic Works, Inc.....Philadelphia.

**MARINE RAILWAYS.**

Hickler Bros.....Sault Ste. Marie, Mich.

**MARINE RAILWAYS, BUILDERS OF.**

Crandall & Son, H. I.....East Boston, Mass.

**MATTRESSES, CUSHIONS, BEDDING.**

Fogg, M. W.....New York.

**MECHANICAL DRAFT FOR BOILERS.**

American Ship Building Co.....Cleveland.  
Detroit Ship Building Co.....Detroit.  
Great Lakes Engineering Works.....Detroit.  
Sturtevant, B. F. Co.....Hyde Park, Mass.

**METALLIC PACKING.**

Katzenstein, L. & Co.....New York.

**METAL POLISH.**

Bertram's Oil Polish Co.....Boston.

**MOTORS, GENERATORS—ELECTRIC.**

Fisher Electrical Works.....Detroit.  
General Electric Co.....Schenectady, N. Y.  
Sturtevant, B. F. Co.....Hyde Park, Mass.  
Westinghouse Electric & Mfg. Co.....Pittsburg, Pa.



## Buyers' Directory of the Marine Trade.—Continued.

**NAUTICAL INSTRUMENTS.**

Ritchie, E. S., &amp; Sons.....Brookline, Mass.

**NAUTICAL SCHOOLS.**

Chicago Nautical School.....Chicago.

**NAVAL ARCHITECTS.**

Hynd, Alexander.....Cleveland.  
 Kidd, Joseph.....Duluth, Minn.  
 Kreer & Parsons.....Chicago.  
 Lovejoy, H. O.....Buffalo.  
 Matteson & Drake.....Philadelphia.  
 Mosher, Chas. D.....New York.  
 Nacey, James.....Cleveland.  
 Rice, Henry.....Buffalo.  
 Sadler, Perkins & Field.....New York.  
 Steel, Adam.....Cleveland.  
 Wood, W. J.....Chicago.

**OAKUM.**

DeGrauw, Aymar & Co.....New York.  
 Stratford, Oakum Co.....Jersey City, N. J.

**OIL ENGINES.**

Mietz, Aug.....New York.

**OILS AND LUBRICANTS.**

Dixon Crucible Co., Joseph.....Jersey City, N. J.  
 Standard Oil Co.....Cleveland.

**PACKING.**

Crane Co.....Chicago.  
 Jenkins Bros.....New York.  
 Katzenstein, L. & Co.....New York.  
 New York Belting & Packing Co.....New York.

**PACKING TOOL.**

Matteson &amp; Drake.....Philadelphia.

**PAINTS.**

Baker, Howard H. & Co.....Buffalo.  
 Detroit Varnish Co.....Detroit.  
 Detroit White Lead Works.....Detroit.  
 New Jersey Zinc Co.....New York.  
 Upson-Walton Co.....Cleveland.

**PATTERN SHOP MACHINERY.**

Atlantic Works, Inc.....Philadelphia.

**PILE DRIVING AND SUBMARINE WORK.**

Buffalo Dredging Co.....Buffalo.  
 Chicago & Gt. Lakes Dredge & Dock Co.....Chicago.  
 Dunbar & Sullivan Dredging Co.....Buffalo.  
 Fitz-Simons & Connell Co.....Chicago.  
 Hickler Bros.....Sault Ste. Marie, Mich.  
 Lake Superior Contracting & Dredging Co.....Duluth, Minn.  
 Parker Bros. Co., Ltd.....Detroit.  
 Smith Co., L. P. & J. A.....Cleveland.  
 Starke Dredge & Dock Co., C. H.....Milwaukee.  
 Sullivan, M.....Detroit.

**PIPE, WROUGHT IRON.**

Bourne-Fuller Co.....Cleveland, O.  
 Crane Co.....Chicago.  
 Macbeth Iron Co.....Cleveland.

**PLANING MILL MACHINERY.**

Atlantic Works, Inc.....Philadelphia.

**PLATES—SHIP, STRUCTURAL, ETC.**  
 Bourne-Fuller Co.....Cleveland, O.  
 Otis Steel Co.....Cleveland.

**PNEUMATIC TOOLS.**

Allen, John F.....New York.

**POLISH FOR METALS.**

Bertram's Oil Polish Co.....Boston.

**PRESSURE REGULATORS.**

Kieley & Mueller.....New York.  
 Ross Valve Co.....Troy, N. Y.

**PROPELLER WHEELS.**

American Ship Building Co.....Cleveland.  
 Atlantic Works.....East Boston, Mass.  
 Cramp, Wm. & Sons.....Philadelphia.  
 Detroit Ship Building Co.....Detroit.  
 Fore River Shipbuilding Co.....Quincy, Mass.  
 Great Lakes Engineering Works.....Detroit.  
 Hyde Windlass Co.....Bath, Me.  
 Jenks Ship Building Co.....Port Huron, Mich.  
 Lockwood Mfg. Co.....East Boston, Mass.  
 Macbeth Iron Co.....Cleveland.  
 Milwaukee Dry Dock Co.....Milwaukee.  
 Newport News Ship Building Co.....Newport News, Va.  
 Phosphor Bronze Smelting Co., Ltd.....Philadelphia.

Roelker, H. B.....New York.  
 Sheriffs Mfg. Co.....Milwaukee.  
 Superior Ship Building Co.....Superior, Wis.  
 Thropp & Sons Co., J. E.....Trenton, N. J.  
 Trout, H. G.....Buffalo.  
 United States Ship Building Co.....New York.

**PROJECTORS, ELECTRIC.**

General Electric Co.....Schenectady, N. Y.  
 Westinghouse Electric & Mfg. Co.....Pittsburg, Pa.

**PUMPS FOR VARIOUS PURPOSES.**

Blake, Geo. F., Mfg. Co.....New York.  
 Great Lakes Engineering Works.....Detroit.  
 Kingsford Foundry & Machine Works.....Oswego, N. Y.

**PUNCHES, RIVETERS, SHEARS.**

Allen, John F.....New York.

**RANGES.**

Russell &amp; Watson.....Buffalo.

**REFRIGERATING APPARATUS.**

Great Lakes Engineering Works.....Detroit.  
 Roelker, H. B.....New York.

**REGISTER FOR CLASSIFICATION OF VESSELS.**

Great Lakes Register.....Cleveland.  
 Record of American & Foreign Shipping.....New York.

**REPAIRS—ENGINE AND BOILER.**

(See also Boiler Manufacturers and Engine Builders.)

Georgian Bay Engineering Works.....Midland, Ont.

**RIVETING MACHINES.**

Allen, John F.....New York.

**RIVETS, STEEL FOR SHIPS AND BOILERS.**

Bourne-Fuller Co.....Cleveland, O.

**SAFETY VALVES.**

American Steam Gauge & Valve Mfg. Co.....Boston.  
 Ashton Valve Co.....Boston.  
 Crane Co.....Chicago.  
 Lunkenheimer Co.....Cincinnati.

**SAIL MAKERS.**

Baker, Howard H. & Co.....Buffalo.  
 Upson-Walton Co.....Cleveland.  
 Wilson & Silsby.....Boston.

**SALVAGE COMPANIES.**

See Wrecking Companies.

**SCHOOLS—NAVIGATION.**

Chicago Nautical School.....Chicago.

**SEARCH LIGHTS.**

General Electric Co.....Schenectady, N. Y.  
 Westinghouse Electric & Mfg. Co.....Pittsburg, Pa.

**SHEARS.**

See Punches, Rivets, and Shears.

**SHIP AND BOILER PLATES AND SHAPES.**

Bourne Fuller Co.....Cleveland, O.  
 Otis Steel Co.....Cleveland.

**SHIP BUILDERS.**

American Ship Building Co.....Cleveland.  
 Atlantic Works.....East Boston, Mass.  
 Bertram Engine Works Co., Ltd.....Toronto, Can.  
 Buffalo Dry Dock Co.....Buffalo.  
 Cramp, Wm. & Sons.....Philadelphia.  
 Craig Ship Building Co.....Toledo, O.  
 Chicago Ship Building Co.....Chicago.  
 Detroit Ship Building Co.....Detroit.  
 Fore River Shipbuilding Co.....Quincy, Mass.  
 Great Lakes Engineering Works.....Detroit.  
 Jenks Ship Building Co.....Port Huron, Mich.  
 Lockwood Mfg. Co.....East Boston, Mass.  
 Manitowoc Dry Dock Co.....Manitowoc, Wis.  
 Maryland Steel Co.....Sparrows Point, Md.  
 Milwaukee Dry Dock Co.....Milwaukee.  
 Newport News Ship Building Co.....Newport News, Va.  
 New York Shipbuilding Co.....Camden, N. J.  
 Roach's Ship Yard.....Chester, Pa.  
 Shipowner's Dry Dock Co.....Chicago.  
 Smith & Son, Abram.....Algonac, Mich.  
 Willard, Chas. P. & Co.....Chicago.

**SHIP CHANDLERS.**

Baker, Howard H. & Co.....Buffalo.  
 Marine Mfg. & Supply Co.....New York.  
 Upson-Walton Co.....Cleveland.

**SHIP DESIGNERS.**

Kidd, Joseph.....Duluth.  
 Kreer & Parsons.....Chicago.  
 Matteson & Drake.....Buffalo.  
 Rice & Lovejoy.....Buffalo.  
 Steel, Nacey & Hynd.....Cleveland.  
 Wood, W. J.....Chicago.

**SHIP LANTERNS AND LAMPS.**

Russell &amp; Watson.....Buffalo.

**SHIP TIMBER.**

Martin-Barriess Co.....Cleveland.

**SMOOTH-ON COMPOUND, FOR REPAIRS.**

Smooth-On Mfg. Co.....Jersey City, N. J.

**STAYBOLTS, IRON OR STEEL, HOLLOW OR SOLID.**

Falls Hollow Staybolt Co.....Cuyahoga Falls, O.

**STEAM VESSELS FOR SALE.**

Gilchrist & Co., C. P.....Cleveland.  
 Holmes, Samuel.....New York.  
 Lester, S. S.....Quebec, Can.  
 McCarthy, T. R.....Montreal, Can.

**STEAMSHIP LINES, PASS. AND FREIGHT.**

American Line.....New York.  
 Anchor Line.....Buffalo.  
 Boston Steamship Co.....Boston.  
 Cleveland & Buffalo Transit Co.....Cleveland.  
 Detroit & Cleveland Line.....Cleveland.  
 Erie & Western Trans. Co.....Buffalo.  
 Goodrich Trans. Co.....Chicago.  
 International Mercantile Marine Co.....Philadelphia.  
 Manitou Steamship Co.....Chicago.  
 Mexican-American S. S. Co.....New Orleans, La.  
 New York & Cuba Mail S. S. Co.....New York.  
 Niagara, St. Catharines & Toronto Ry. & Nav. Co.....St. Catharines, Ont.  
 Northern Michigan Trans. Co.....Chicago.  
 Red Star Line.....New York.  
 Richelieu & Ontario Nav. Co.....Montreal, Can.  
 United Fruit Co.....Boston.

**STEEL CASTINGS.**

Macbeth Iron Co.....Cleveland.  
 Otis Steel Co.....Cleveland.

**STEERING APPARATUS.**

American Ship Building Co.....Cleveland.  
 Chase Machine Co.....Cleveland.  
 Dake Engine Co.....Grand Haven, Mich.  
 Detroit Ship Building Co.....Detroit.  
 Hyde Windlass Co.....Bath, Me.  
 Jenks Ship Building Co.....Port Huron, Mich.  
 Marine Mfg. & Supply Co.....New York.  
 Moulton Steering Engine Co.....New York.  
 Pawling & Harnischfeger.....Milwaukee.  
 Sheriffs Mfg. Co.....Milwaukee.

**SUBMARINE DIVING APPARATUS.**

Morse & Son, A. J.....Boston.  
 Schrader's Son, A.....New York.

**SURVEYORS, MARINE.**

Gaskin, Edward.....Buffalo.  
 Hynd, Alexander.....Cleveland.  
 Lovejoy, H. O.....Buffalo.  
 Matteson & Drake.....Philadelphia.  
 Parker Bros. Co., Ltd.....Detroit.  
 Nacey, James.....Cleveland.  
 Rice, Henry.....Buffalo.  
 Steel, Adam.....Cleveland.  
 Wood, W. J.....Chicago.

**TESTS OF MATERIALS.**

Hunt, Robert W. & Co.....Chicago.  
 Pittsburg Testing Laboratory, Ltd.....Pittsburg.

**TILING, INTERLOCKING RUBBER.**  
 New York Belting & Packing Co.....New York.

**TOOLS, METAL WORKING, FOR SHIP AND ENGINE WORKS.**

Allen, John F.....New York.  
 Watson-Stillman Co.....New York.

**TOOLS, WOOD WORKING.**

Atlantic Works, Inc.....Philadelphia.

**TOWING MACHINES.**

American Ship Windlass Co.....Providence, R. I.  
 Chase Machine Co.....Cleveland.

**TOWING COMPANIES.**

Donnelly Salvage & Wrecking Co.....Kingston, Ont.  
 Great Lakes Towing Co.....Cleveland.  
 Midland Towing & Wrecking Co., Ltd.....Midland, Ont.

**TRAPS, STEAM.**

Kieley & Mueller.....New York.  
 Lunkenheimer Co.....Cincinnati.  
 Sturtevant Co., B. F., Hyde Park, Mass.

**TRUCKS.**

Boston &amp; Lockport Block Co.....Boston.

**TUBING, SEAMLESS.**

Shelby Steel Tube Co.....Pittsburg, Pa.

## Buyers' Directory of the Marine Trade.—Continued.

**VALVES, STEAM SPECIALTIES, ETC.**

American Steam Gauge & Valve Mfg. Co. Boston.  
 Ashton Valve Co. Boston.  
 Crane Co. Chicago.  
 Jenkins Bros. New York.  
 Kieley & Mueller New York.  
 Lunkenheimer Co. Cincinnati.  
 Ross Valve Co. Troy, N. Y.

**VALVES FOR WATER AND GAS.**

Ross Valve Co. Troy, N. Y.

**VARNISHES.**

Detroit Varnish Co. Detroit.  
 Detroit White Lead Works. Detroit.  
 New Jersey Zinc Co. New York.  
 Also Ship Chandlers.

**VENTILATING APPARATUS FOR SHIPS.**

Sturtevant, B. F. Co. Hyde Park, Mass.

**VESSEL AND FREIGHT AGENTS.**

Boland, John J. Buffalo.  
 Brown & Co. Buffalo.  
 Elphicke, C. W. & Co. Chicago.  
 Fleming & Co., P. H. Chicago.  
 Gilchrist & Co., C. P. Cleveland.  
 Hall & Root Buffalo.  
 Helm & Co., D. T. Duluth.

**VESSEL AND FREIGHT AGENTS—Con.**

Hawgood & Co., W. A. Cleveland.  
 Holmes, Samuel New York.  
 Hutchinson & Co. Cleveland.  
 Lester, S. S. Quebec, Can.  
 McCarthy, T. R. Montreal.  
 Mitchell & Co. Cleveland.  
 Parker Bros. Co., Ltd. Detroit.  
 Prindville & Co. Chicago.  
 Richardson, W. C. Cleveland.  
 Sullivan, D. & Co. Chicago.

**WATER GAUGES.**

Bonner & Co., Wm. T. Boston.  
 Lunkenheimer Co. Cincinnati, O.

**WIRE ROPE AND WIRE ROPE FITTINGS.**

Baker, H. H. & Co. Buffalo.  
 DeGrauw, Aymar & Co. New York.  
 Upson-Walton Co. Cleveland.

**WHISTLES, STEAM.**

American Steam Gauge & Valve Mfg. Co. Boston.  
 Ashton Valve Co. Boston.  
 Lunkenheimer Co. Cincinnati.

**WINDLASSES.**

American Ship Windlass Co. Providence, R. I.  
 American Ship Building Co. Cleveland.  
 Hyde Windlass Co. Bath, Me.  
 Jenks Ship Building Co. Port Huron, Mich.  
 Marine Mfg. & Supply Co. New York.

**WINCHES.**

American Ship Windlass Co. Providence, R. I.  
 Georgian Bay Engineering Works. Midland, Ont.  
 Hyde Windlass Co. Bath, Me.

**WOOD WORKING MACHINERY.**

Atlantic Works, Inc. Philadelphia.

**WRECKING AND SALVAGE COMPANIES.**

Donnelly Salvage & Wrecking Co. Kingston, Ont.  
 Great Lakes Towing Co. Cleveland.  
 Midland Towing & Wrecking Co., Ltd. Midland, Ont.  
 Parker Bros. Co., Ltd. Detroit.

**YACHT AND BOAT BUILDERS.**

Bertram Engine Works Co., Ltd. Toronto, Can.  
 Drein, Thos. & Son. Wilmington, Del.  
 Georgian Bay Engineering Works. Midland, Ont.  
 Truscott Boat Mfg. Co. St. Joseph, Mich.  
 Willard, Chas. P. & Co. Chicago.

**YAWLS.**

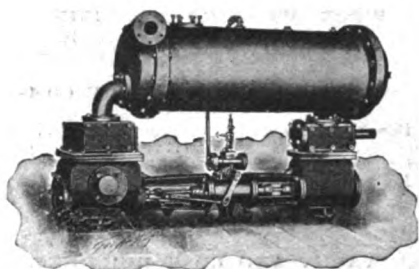
Drein, Thos. & Son. Wilmington, Del.

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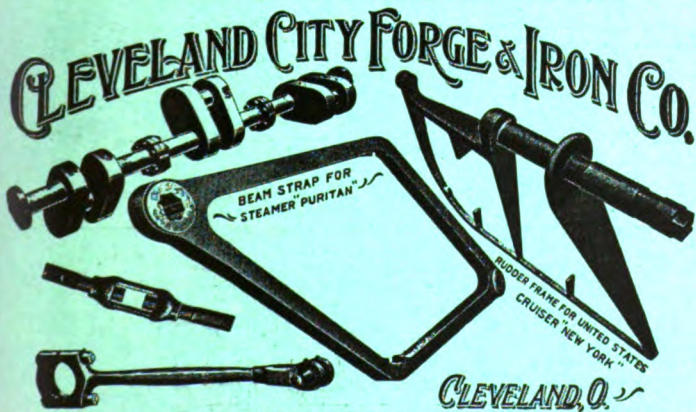


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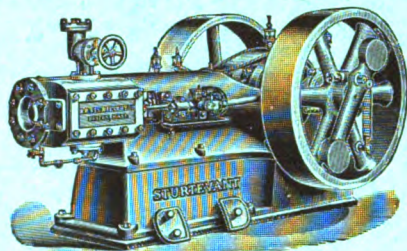
Eastward	Arrive from West	Depart East
No. 18, Southwestern Limited .....	.....	*1:50 a.m.
No. 22, Lake Shore Limited .....	*2:12 a.m.	*2:20 a.m.
No. 20, Chicago and Cleveland Exp. ....	*7:20 a.m.	.....
No. 28, New York and Boston Exp. ....	*7:40 a.m.	*8:00 a.m.
No. 40, Toledo and Buffalo Accom. ..	†10:00 a.m.	†10:30 a.m.
No. 32, Fast Mail .....	*11:25 a.m.	*11:30 a.m.
No. 48, Accommodation via Sandusky ..	†1:40 p.m.	.....
No. 42, Boston-New York Express .....	.....	*11:45 a.m.
No. 44, Cleveland and New York Spl. ....	.....	*3:00 p.m.
No. 46, Southwestern Express .....	.....	*3:10 p.m.
No. 116, Ashtabula Accommodation. ....	.....	†4:30 p.m.
No. 6, Limited Fast Mail .....	*5:40 p.m.	*5:45 p.m.
No. 26, 20th Century Limited .....	*7:40 p.m.	*7:43 p.m.
No. 10, Chicago, N.Y. & Boston Spl. ....	*7:30 p.m.	*7:50 p.m.
No. 16, New England Express .....	*10:30 p.m.	*10:35 p.m.
No. 2, Day Express .....	†9:10 p.m.	†9:25 p.m.
No. 126, Norwalk Accommodation ..	†7:55 a.m.	.....
Westward	Arrive from East	Depart West
No. 7, Exposition Limited .....	*12:50 a.m.	.....
No. 11, Southwestern Limited .....	*2:55 a.m.	.....
No. 9, Day Express .....	.....	†6:10 a.m.
No. 15, Boston and Chicago Special. ....	*3:10 a.m.	*3:15 a.m.
No. 19, Lake Shore Limited .....	*7:15 a.m.	*7:25 a.m.
No. 23, Western Express .....	*10:30 a.m.	*10:35 a.m.
No. 29, Southwestern Special .....	†11:10 a.m.	.....
No. 33, Southwestern Express .....	*12:25 p.m.	.....
No. 133, Cleveland and Detroit Exp. ....	.....	*12:45 p.m.
No. 47, Accommodation .....	†11:00 a.m.	†3:00 p.m.
No. 141, Sandusky Accommodation ..	.....	†3:10 p.m.
No. 43, Fast Mail .....	*4:35 p.m.	*4:40 p.m.
No. 127, Norwalk Accommodation ..	.....	†5:10 p.m.
No. 37, Pacific Express .....	*6:50 p.m.	*7:20 p.m.
No. 3, Fast Mail Limited .....	*10:50 p.m.	*10:55 p.m.
No. 115, Ashtabula Accommodation ..	*8:30 a.m.	.....

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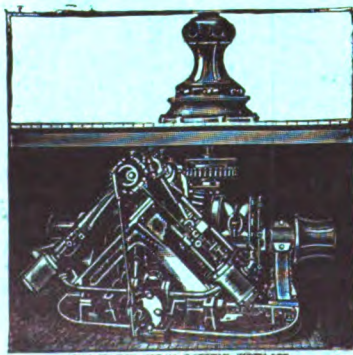
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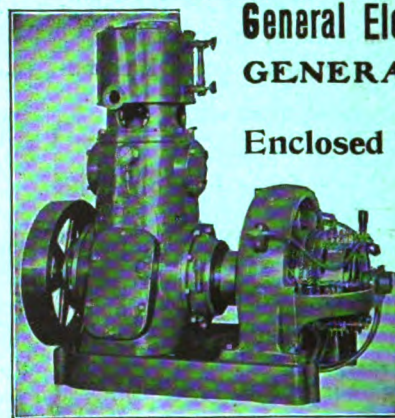
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